PROCEEDINGS

OF THE

SIXTH STATE SANITARY CONVENTION,

HELD AT

Erie, Pa., March 29-31, 1892.

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ERIE, *March 29, 30 and 31, 1892.*

The Convention met at Mennerchor Hall at 10.30 a. m., and was called to order by the Hon. J. F. Downing, of Erie, who had been requested to act as president.

Prayer was offered by Rev. J. C. Wilson.

On motion of Dr. Benjamin Lee, Prof. Wm. B. Atkinson, M. D., of Philadelphia, was elected secretary.

An address of welcome was delivered by Hon. J. F. Downing, in the absence of the mayor of Erie who was detained by illness.

Dr. A. A. Woods, health officer of Erie, read a paper on diphtheria as it prevailed in Erie during January, February and March, 1892, and November and December, 1891. The report was discussed by Drs. G. G. Groff and Benjamin Lee.

At the afternoon session, Dr. Barr, of Titusville, was called to the chair.

Crosby Gray, Chief Clerk Department of Public Safety, Pittsburg, read a paper "Notes on Sanitary Condition and Necessities of Pittsburg."

Dr. E. Cranch, of Erie, read a paper on "Prophylaxis and Quarantine of Scarlet fever." Discussed by Drs. Whitcomb, Woods, Bradley, Lee, Atkinson, Groff, Motter and Davis.

Dr. George G. Groff, of Lewisburg, read a paper on "Emergency Hospitals." Discussed by Drs. Varian, Motter and others.

Colonel W. F. Morse of New York, read a paper on "Methods of Collection and Disposal of Waste and Garbage."

At the evening session, Dr. Murray Galt Motter, of Lancaster, read a paper on "Trichinosis."

Dr. S. T. Davis of Lancaster, read a paper on "Faith Cure Epidemic."

On Wednesday, March 30, the Convention re-assembled at the Tabernacle Church, Prof. S. R. Thompson, of Westminster College, presiding.

Dr. G. G. Groff, of Lewisburg, read a paper on the "Hygienic Care of Dairy Farms and Dairies."

A paper in discussion by Dr. J. C. Morris, of Philadelphia, was read by the secretary.

Dr. L. H. Taylor, of Wilkes-Barre, read a paper on "Typhoid Fever Caused by Impure Milk Supply."

Dr. J. H. Montgomery, of Erie, read a paper "Compulsory Domiciliary Quarantine against Diphtheria."

At the afternoon session, Dr. B. E. Mossman, of Greenville, read a paper on the "Enforcement of Sanitary Laws."

Dr. D. N. Dennis, of Erie, read a paper on "Microscopic Examination of Water from Public Water Supply of Erie."

Dr. G. G. Groff read a paper on "Earth Closets."

The secretary read a paper by J. M. Simonin, C. E., of Philadelphia, on "The Sanitary Utilization of Garbage and Refuse, and Destruction of Germ Life in Infected Material without Injury to the Article Treated."

George E. Platt, City Engineer of Erie, read a paper on the "Sewer System of Erie and the Indispensable Improvements Needed Therein."

S. S. Jones, Editor Carbondale *Leader* and secretary board of health of Carbondale, read a paper entitled "Difficulties to Overcome."

Dr. Wm. B. Atkinson, of Philadelphia, read a paper "Diagnosis of Typhus Fever and the Steps Taken by the State Board to Prevent its Introduction or Spread in the State."

Dr. D. B. D. Beaver, of Reading, read a paper on "Is Typhoid Fever a Rural Disease?"

In the evening the Convention listened to the annual address, "The Economic Value of Sanitation," by Peter H. Bryce, M. D., of Toronto, Member of the Provincial Board of Health of Ontario.

The Members of the Board, the Medical Inspectors and guests were entertained at a banquet on Wednesday evening by the authorities of Erie.

The Economic Value of Sanitation.

By P. H. Bryce, M. A., M. D.,

Secretary of Provincial Board of Health of Ontario, Toronto.

Gentlemen: To an audience such as this it will not be necessary for me to define at any length the word sanitation; but I may say, in brief, that I shall take it as meaning the act of keeping or making whole, sound or healthy, whether it be applied to the individual, the municipality, or the nation. But, indeed, as nations are merely divisions of a larger whole, I shall say, or of the people of the world; since we shall see that this work of sanitation has a truly continental, and even intercontinental meaning; and that the watchword the sanitarian may most properly adopt are the words of an American poet:

"No pent-up Utica confines our powers,
But a whole, vast continent is ours."

If, then, our definition be accepted, it ought not be difficult for every one in my audience to agree with me, that keeping healthy has a value —and, indeed, an economic value—of a very definite character.

Assuming, then, that my audience agrees with the premises, I trust I shall not find it difficult to carry them with me in the conclusions which I shall endeavor to draw therefrom.

The definition I have given of sanitation at once makes it evident that into whatsoever spheres man's life and activities enter, whether of being or doing, the degree or quality of his soundness or wellness must have an economic value, capable of being accurately measured or weighed in proportion as we have the exact length of the measuring-yard or the balances sufficiently well adjusted.

I propose, therefore, briefly to show where, in a few instances, economic losses and gains have occurred; and shall thereafter endeavor to indicate how sanitarians have in the past added and are still endeavoring to add to the credit side of the ledger.

In the Centennial Discourse of the late lamented Dr. Henry I. Bowditch, of Boston, on Preventive Medicine, he refers to the First Epoch of Medicine in America—ending in 1832—as the so-called "Drug Epoch," wherein drugs were everything and Nature was forgotten.

From this period to 1868, when the First State Board of Health was established, he calls the Second Epoch, wherein has been seen the growth of a skepticism as to the value of drugs, and a profound reverence for Nature and a strong belief in her powers of limiting and curing disease.

Nowhere has the popular side of this belief been more neatly expressed than by the Honorable Thomas F. Bayard, late Secretary of State, in an address to the International Medical Congress, at Washington, in 1887, when he said, "Forgive me if, as one of the great army of patients, I humbly petition the profession that in your deliberations Nature may be allowed a hearing when remedies are proposed; that her *vis medicatrix* may not be omitted in computing the forces of cure, and that science may be restricted as often as possible to sounding the alarm for Nature to hasten, as she surely will, if permitted, to the defense of the point assailed."

In this period, although much more brief, positive legislative results were forthcoming, and in it may be set down, as in England, the inauguration of an epoch which Bowditch has called "that of observation," or "the accurate recording of facts, and subsequent analysis of them."

To this period we look back, as sanitarians, with reverence, as being that wherein modern sanitation was born. As early as 1828 the late Sir Edwin Chadwick had published an article in the *Westminster Review* on "Life Assurance."

He commenced, without any strong bias, an inquiry as to whether the surroundings or environments of individuals have an influence on their health and duration of life. His conclusions, which were opposed to those stated by the Government Actuary to a Parliamentary Committee, were that the expectancy of life in the middle classes of England, with improved social and moral conditions, had distinctly improved. And,

as he has stated, from the train of reasoning thus developed grew what he called "The Sanitary Idea." Other articles followed on "Preventive Police" and "Public Charities."

After slumming in the east end of London, where he contracted typhus fever and all but succumbed to it, in 1832 he was appointed Secretary of a Royal Commission of Inquiry into the Poor Law System.

In 1838 a severe outbreak of fever in East London caused an inquiry to be held into its cause, and thus "the first sanitary commission was appointed, and its reports caused quite a sensation and a demand therefor, till 9,000 copies were distributed."

But another outcome of Chadwick's early labors was the institution, in 1838, of the registration of births, marriages and deaths in England--to the position of registrar of which the distinguished Dr. Farr was appointed.

I need not, gentlemen, further outline the rise of sanitation. Given the two elements of observation and registration, we have the factors necessary to the study of the economics of the science.

Said the late Dr. Parkes: "The attention now paid to the public health is in a large degree owing to the careful collection of births and deaths, and of the causes of death in England during the last fifty years."

We see, then, that in this so-called epoch of observation were supplied, notably in England, the elements necessary to the determination of the principal factors which enable us to draw fair conclusions regarding the value of sanitation to the State.

The Value of Life.

Reference has already been made to some studies carried on at the beginning of the "sanitary period" on the commercial value of life. This must be our starting point. All must agree that the individual life has a certain value to the State, simply from its power to produce wealth. The first estimations regarding the value of life were intended to enable the government of England to fix the annual amount which ought to be paid as an annuity on a certain amount paid over to it; and that insurance companies might equitably estimate the amount of premium to be paid on a policy issued for a given amount. The result of extended inquiry into the lives of government annuitants was that, during the century preceding 1830, the length of life had notably increased and especially in the years succeeding the Napoleonic wars.

Baron Delessert showed that in France in the

14th	century	1	person	died	in	every 17
17th	"	1	"	"	"	" 25
18th	"	1	"	"	"	" 30
1820–25		1	"	"	"	" 39

The importance of this fact became at once manifest. It was seen that if a life was prolonged by twenty-five per cent., then the govern-

ment would by that amount be paying too much for an annuity. On the other hand, insurance companies were becoming enormously rich by basing rates on the supposition of the duration of life being, say twenty-five per cent. shorter than it actually was.

We thus can see that a life must be considered as having an actual cash value to the State, whether viewed from its power to produce wealth, or by the capital which, made by the annuitant, is actually loaned to the State, for investment in some presumably profitable manner.

Manifestly, therefore, the saving of the lives of the population of a State is one of the most positive methods for the production of wealth, much better by far than the introduction of new populations by immigration, who apart from their possibly lower physical, moral and mental status and foreign tongue, must be, for some years at the best, of small value, not being trained to the special customs and class of work of a new country.

Let me now present a few illustrations of how wealth in this sense has increased in England:

In 1650 England had a population of						5,500,000
" 1801	"	"	"	"	"	8,892,586
" 1878	"	"	"	"	"	25,000,000

and during this latter period she has also contributed many millions to the population of the United States. We have already seen that the duration of life was increasing, the registrar general's returns showing that

In 1849 in England, a cholera year, the death rate was 25.1 per 1,000.
1866 " " " " " " " " " " 23.0 " "

From 1876 onward there has been an almost uninterrupted fall. In 1871–80 its mean was 21.27. In 1889 it was only 17.8.

Says Dr. Farr, of the period between 1871–80, the reduced rate meant an annual saving of 20,000 lives; or, comparing the period of 1838 to 1854 with that of 1871–80, the rate in the latter added nearly two years to the life of every boy, as compared with that in the former; or 39.91 years increased to 41.35. Or, to put it another way, taking the annual births between 1871–80 at 858,878, the difference between the two rates shows a gain for the whole children at the latter rate as compared with the former of 1,800,047 years.

What this saving of life means, is that every year of the latter period saved to England 20,000 people, or 200,000 in all, having a length of life of forty years—thereby giving to the State all the wealth which each may produce during forty years.

Quality of the Value of Life.—It must, from what has been said, appear evident to every one, that whatever has improved the conditions whereby life is prolonged, has served the economic purpose of increasing the population of a country. But some might object that it does

not follow that wealth has increased simply because population has, remembering that $50 of pure silver dollars would equal $100 in silver if 50 per cent. was base alloy.

I shall endeavor, however, to show further, that the quality of the value of life is actually proportionately increased by sanitation.

This is seen in several ways; thus

(*a*) Assuming, as is the case, that about one in every fifteen of the English population is an artisan, and that he has two years added to his life, then as skill increases with experience we may say the producing value of 2,000,000 and more of English artisans for two years is added to the wealth of the country.

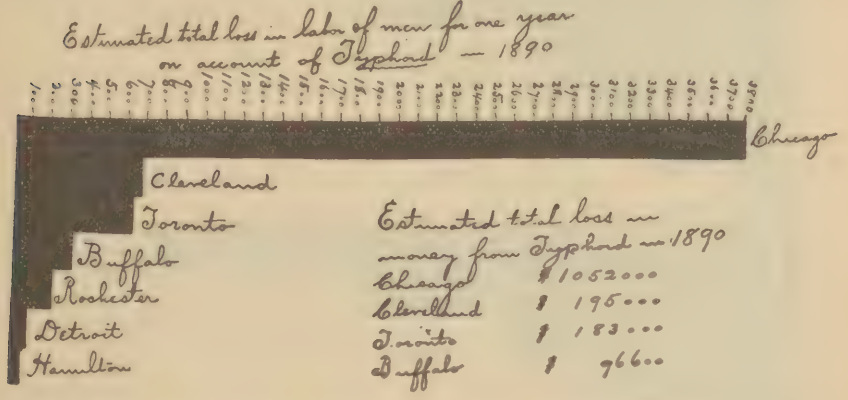
(*b*) By the relatively higher continued healthfulness of the man, who is to live two years longer than under other conditions. This is a fact beyond dispute. It has not infrequently been stated in a superficial way that by reducing the mortality we maintain alive a population of weaklings. But the statement is most misleading. If it be true that if by purifying the air of a city or a single workshop, wherein are 100,000 people or 100 employes, we are able to keep the infants and children from dying at the rate of one to four in the first year, or fifty per cent. of all under five years of life, it is equally true that in the other we have enabled, say, 100 work-girls to maintain a higher average of health, and while the weak might in a vitiated air have become unfitted for work, the strong would proportionately have had their average health reduced. Or, to put the matter in another way, suppose 10, 9, 8, 7, 6, 5 be taken as degrees of resistance to disease, and that all below 5 are doomed to die before reaching 21 years, then it is plain that any influence by which the resistance to disease is lessened does by so much tend to depress the first five proportionately, the rest below the line which to the onlooker is called the health line. Indeed, as has been well said, "The whole object of sanitary legislation is to so increase the resistive power as to incase the body in that which shall be proof against an attack." This is on the positive side; but on the negative it may be said yet more truly "that the object is to remove those influences or conditions which may be called the attacking forces."

Sir Spencer Wells, before the Sanitary Institute of Great Britain, as president in 1886, said: "Assuming that in fifty years 200,000 of a population had been saved by sanitation and medical work, then their economical value was at least £300,000,000, and that a clear gain." Formerly it was calculated that one in twenty-three of the population was constantly sick and the products of all their labor necessarily withdrawn. A great deal of this sickness has been altogether prevented, and the duration of that which comes in spite of sanitation is lessened.

But having set forth the economic value of sanitation so far as it saves lives to the State, I shall now illustrate its bearing upon the prosperity of some of our lakeside cities before adverting to some of the more modern of our sanitary or life saving appliances.

To this end I have had prepared three diagrams, which show what the death rate was in the several cities during the year 1890 for the two contagious diseases which cause the major proportion of deaths—typhoid and diphtheria. As will be seen from their relative prevalence in different cities, they stand in two very distinct categories as regards causation. While both are filth diseases, and hence are both capable of being propagated in town filth and sewage, yet diphtheria does not seem capable of causing extended epidemics through polluted water supplies, while on the other hand typhoid is now known to cause town epidemics principally through this medium. They also have two other distinctive differences, viz: First, that typhoid attacks especially persons of fifteen and over, while diphtheria is comparatively infrequent among adolescents and adults; and second, that while typhoid is but slightly disseminated by direct contact, with ordinary care, diphtheria is intensely infectious to the young, who are peculiarly susceptible to it.

The diagrams referred to illustrate this in a remarkable manner. Take Chicago and Detroit for instance. In Chicago the death rate from

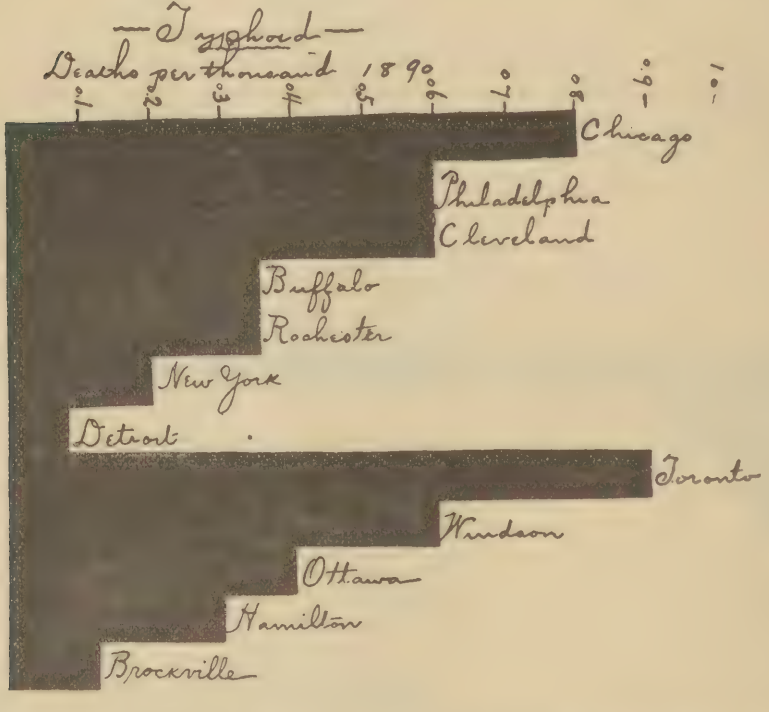


both is high, while in Detroit typhoid is remarkably low and diphtheria is enormously high: the disproportion here seen to be so great exists to some extent in the other cities, while the special conditions to which I shall allude exist to a greater or less extent.

By reference to the diagram for typhoid it will be seen that it is high in Chicago, Cleveland and Toronto. All of these cities get their water supply from the great lakes, as do the others, but mark the difference. In each of these the city's sewage is poured into the bay or lake in front of the city, whereas Detroit, Buffalo and Brockville pour their sewage into the great rivers flowing past them at the rate of several miles an hour, making the least contamination of their drinking water impossible. In the case of Hamilton, while the sewage is poured into the bay it is wholly land-locked, and the water is pumped from the lake outside the bar. Curiously enough Windsor, a town of 10,000 in-

habitants, has a death rate from typhoid approaching the average of Chicago and Toronto, though it is opposite Detroit, but the difference is due to the fact that Walkerville sewage passes into the river a few hundred yards above the Windsor intake pipe.

What is here stated will, I believe, prove to be a law of pollution, viz: That taking a series of years the pollution of even relatively immense bodies of lake water which, having no regular flow, are liable to carry sewage to a water intake will, at certain seasons and with winds moving sewage toward the point of supply, cause outbreaks of typhoid



more or less epidemic.* I further believe that we can establish from these diagrams another law, viz: "That in cities obtaining practically all their drinking water from a public supply whose source is beyond the possibility of contamination, typhoid fever will practically disappear from the list of causes of mortality."

As regards diphtheria, from what I have said it will be gathered that I take it to be a fact that its prevalence depends directly in towns where public water is in general use upon direct contagion—in other words,

* Thus a weekly analysis of Chicago water showed that with a southwest wind, continuing for a week, the albuminoid ammonia of the water rose from .065, gradually but constantly to .120 per million parts. This wind moves sewage from the sewer outfalls toward the water intake pipe.

in those towns where municipal regulations are defective either in scope or in their enforcement, or in both. It thus becomes apparent that sanitation in the matter of these two diseases possesses two largely distinctive elements, one of which belongs peculiarly to the Department of Works, the other to the Department of the Officer of Health.

I have made this digression in order to explain what the first diagram apparently teaches, and now I shall return to the economic aspect which this diagram presents. You will see it in a moment in the second and third diagrams.

It will be seen that I have assumed that for each death from typhoid there are nineteen who do not die, at any rate, from this disease, although, as is too often the case, it supplies conditions by which the seeds of consumption obtain an entrance to the system and produce, sooner or later, their fatal effects as a sequel.

I have also assumed that each case of typhoid means the loss of a month to the patient and one month to the nurse, but have said nothing about the actual expenses of the sickness in physician's bills, medicines and undertaker's fees, all of which would be proper items in the loss of productive capital.

Taking, then, the figures as we find them, and with these approximately correct assumptions, we obtain the following for Chicago:

Cases .8 per 1,000 by 60 days for nurse and patient equals 960 days per 1,000.

And 960 days by 1,200 equals 1,152,000 days.

This divided by 300 working days equals 3,840 years, or the loss of the year's work of 3,840 men.

At one dollar a day this means the loss of $1,052,000 to Chicago for one year of sickness from typhoid alone. This rate would mean for Detroit a loss of $210,400, whereas Detroit actually did lose only $24,000. On the other hand, if the Detroit rate were attained by Chicago $800,000 would be saved, a sum which would pay the interest, at 3 per cent., on over $26,000,000 of capital to invest in new water works.

Without discussing the losses from typhoid further, I turn to the deaths from that other disease *par excellence* of this northern temperate region, viz: diphtheria.

I have had a chart arranged to show its prevalence as well. It must undoubtedly be considered the pest of our climate. Its microbe may multiply outside of the body like that of typhoid, but has in addition an extreme capacity for spreading by infection. From the tables I therefore draw the following conclusions, viz:

1. In a city or town with an average attention to sanitation we have a more or less constant presence of so-called sporadic cases, amounting, perhaps, in deaths to 3 or 6 per 1,000.

2. Under, however, peculiar seasonal atmospheric conditions (such as a prolonged, dry, warm autumn) the germs of the disease seem to freely

devolop in organic filth, hence an extension of the sporadic cases takes place; but mark the difference with typhoid.

3. Each case of these becomes a new center, each house wherein a case occurs being liable to become a distributing point. Persons, and especially children going to school, spread it broadcast unless the strictest municipal supervision is exercised over these cases and the public school.

4. That since the direct infection is enormously more common than in the sporadic cases, we have in this fact the evidence that the deaths from the disease are in a large degree preventable, and hence form a most important factor in this question of the economics of sanitation.

Since 1880 this disease has undoubtedly had in the country, as a whole, a greater general prevalence than before, though its mortality in several years past has undoubtedly been lessening as compared with the cases occurring. This is but natural if we remember that its spores are vegetable and hence spread just as the spores of the black knot fungus have spread among the fruit trees. With regard to the latter we are aware that what is necessary to limit it is to remove at once a limb affected and burn the knot. We do not, however, imagine that the spores are all destroyed but only those which we have detected on the knot.

It is quite clear, then, that with diphtheria the imperative question in its limitation is isolation or removal of the infection in cases. This may, in large degree, be done by municipal regulations, intelligently and perseveringly administered. That this is done much more thoroughly in one city than another we are very well aware. Taking Detroit as an example: Here it appears that a single city had almost as many deaths in 1890 as had the whole Province of Ontario. Look across the river. We must remember that Windsor is the nearest suburb to the business portion of Detroit, and that there is a constant intercourse between the two cities. In spite of infection, therefore, being frequently brought to Windsor, the disease has been limited there by the active interference of one of the best officers in Canada, supported by most thorough regulations.

Compare Detroit with Hamilton, where the latter city has been under a most vigilant officer for ten years. There diphtheria has so steadily declined as to cause but a small percentage of deaths.

Observe what the losses mean. It may be taken as a fair average that one death occurs in every five cases of diphtheria. At least one nurse's services are constantly required for, say, an average of a fortnight. From these data it thus becomes easy to calculate, as in the case of typhoid, what the loss means. The rate of death is:

Typhoid, 5; 8 Diphtheria.

But we have assumed in the case of the first, twenty cases to one death, and with the latter five cases to one death. Hence the ratio of cases is:

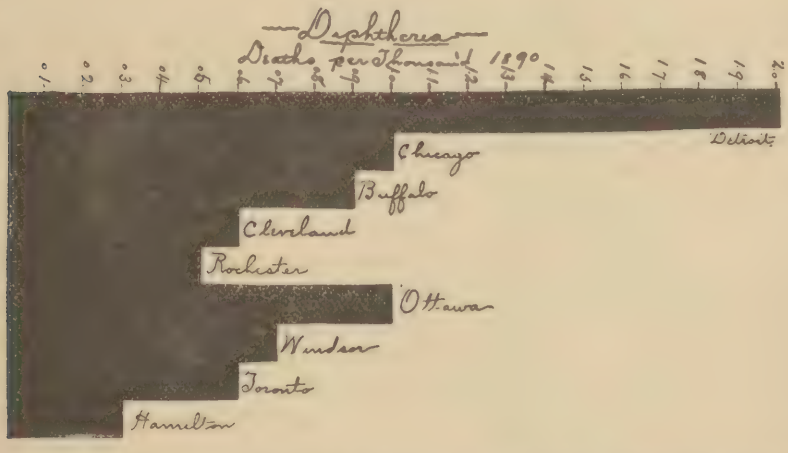
Typhoid, 20; 8 Diphtheria.

And if we assume that the loss in the latter is only one-third of the former in time, we can add what is probably below the real figure, about one-twelfth of the loss from diphtheria to the total average loss from typhoid for all the cities in the list.

Further comment seems needless. It surely is not necessary to add to all this the economic loss from doctors' bills, drug expenses and undertakers' charges, in order to show the extent to which these cities lose annually from imperfect sanitary methods.

We now must advert briefly to some of the methods which modern sanitary science has developed, and is still more rapidly improving, for overcoming the evils of defective sanitation.

Some of the important methods have already or will be set forth in the splended list of papers set down for discussion at the convention. I, therefore, need do but little more than refer to them. I shall do so in the following order:



First of all to be considered is *the house we live in.* Here we have to examine what is under the house, what is about the house, and what is within the house. As regards what is under the house, there are two principal things to be inquired into. With the presence of organic filth, which is *made-up soil*, from old refuse heaps, or filth from vegetables, etc., in the cellars, with moist walls, a house can hardly be made healthy. Cellars certainly can and must be kept clean and sweet. Lime-wash is a great cleanser, while concrete floors, etc., may help the first defect.

Boards decaying from damp in floors are most dangerous, and hence cellars must be drained. But this does not mean that we must let the water come in and then drain it off. Such cellars are always damp, the ground outside must be deeply drained, and to this end field tiles should be laid around the house and connected with field tiles laid in the same trenches with the sewers.

As regards what is around the house, we have especially to remove all organic filth from house slops and yard refuse, to remove heaps and all garbage of lanes and alleys. Hence a systematic sanitary inspection of yards and lanes is a necessity, associated with a frequent and thorough scavenging department. Gradually all yards and lanes should be paved with cobble-stones, or bricks, or other rock material.

As regards what is within the house, cleanliness, or freedom from organic filth must be our watchword. Closets and dark spaces must be tabooed. The fewer carpets and woolen hangings the better, and weekly cleanings are infinitely better than the old half-yearly attacks made upon the stored-up filth. These remarks must apply with the same and even greater force to the school-room, where, daily, forty or fifty children sit for hours, and are constantly inhaling the dust tracked in on boots and shaken from clothing: this, in the house and school, often is the dust of disease. The germs found in the air of rooms are found to be a thousand times more numerous than those in the outer air, even of a town, unless on a windy day.

In the sunshine, with oxygen, they are gradually destroyed, but being borne into the house they collect there, and if stirred up only settle again on the persons and into the lungs of the house-dweller. Among these, from time to time, are borne the germs of infectious disease, either from the outer air, but much more frequently with the boots, clothing and breath of persons from other infected houses or schools, or who have been suffering from disease itself. Thus we know from experience that in the winter months, when houses are closely shut up, these diseases become most prevalent. It thus becomes apparent that municipal control of houses, where infectious disease exists, should be of the most positive character. If the infection is in such a house, it must, for the sake of present and future inmates, be removed at whatever cost. But as we know this is most difficult, it is reasonable that we should allow as few infected houses as possible. Hence it is very much better to have all cases of these diseases removed to isolation houses, hospitals, etc., where they are usually better treated and where infection can be readily destroyed.

But another most dangerous inmate of the house is sewer air. I venture to say that our experience in Toronto is not peculiar to that city alone; and there it is found that not one system of plumbing in twenty will stand the forcing of smoke under pressure into the pipes where defective joints and pipes abound.

Thus drain and plumbing inspection, after the most approved modern fashion, is necessary in all houses already built, and is very easy of accomplishment in every house being constructed.

The fewer plumbing fixtures introduced into a house, the safer does such house remain. But this house plumbing has its exit into public drains and sewers. These in old towns are commonly most defective.

They breathe sewer air at our feet, and, if obstructed, dam back sewage into our houses. Good sewers become a necessity where public water supplies are found, and public water ought to be in every town. There is no village, town or city of many years' growth, where houses are at all aggregated, where wells can be considered a safe source of drinking-water. While in most instances public waters are to be preferred to wells, the general distribution of a single water-supply makes it of extreme importance that the supply should be free from pollution; for if a public supply be polluted, then disease spreads over a city like a pall.

In Ottawa, in 1887, when the public water-supply was led in a wooden pipe about half a mile from that mighty river, a quarter of a mile wide, with no towns above, 1,500 cases of fever appeared within six weeks. It was subsequently found that this pure water was, in the short distance of a quarter of a mile, polluted by several private sewers, which ran into the aqueduct or canal in which the wooden pipe was laid, and which had been constructed to obtain water-power to drain the pumps.

An iron pipe, afterwards laid elsewhere, removed the danger. Need I do more than refer you on this point to the several lakeside cities in our diagrams? Such, in a few sentences, are the principal matters requiring our immediate attention. Such questions as our food supplies – notably our dairy supplies—produced on premises proverbially filthy, cannot receive too much attention. Workshops, factories, etc., have all their special difficulties and dangers, and demand constant and intelligent attention on the part of those having them in charge.

Many other matters require remark, but our time forbids. There is one other point of sanitation which, however, we cannot overlook, and it is this: If a close study be made of the records of our prisons and asylums, we find there that what may be called moral sanitation is in need of greatly increased attention.

England, as we have seen, has a wonderfully developed system of sanitation, and yet she has 18,000 prisoners, 10,000 in penal servitude and 90,000 imprisoned annually on summary convictions.

Several years ago the annual expenditure in the United States for intoxicating liquors was nearly $900,000,000. All are aware how closely allied is the list of the criminal, the insane, and the inebriate to the cost just given. It thus becomes apparent that from an economic standpoint these conditions create an enormous loss. The moral are taxed to support others, who, through disease, imprisonment, poverty, etc., are non-producers—there being thus a double economic loss. It is thus manifest that, as in ordinary sanitation, the interests of the clean are inseparable from those of the unclean.

As has been well said by Sir W. H. Michael, Q. C., an English economist, "It is impossible for us to protect ourselves without caring for the less-favored of the community. Their crimes and their ignorance are their own. Their health is of us, their condition reacts upon us, and in caring for them—in attempting to guard ourselves from injury—we pro-

tect first their interests, that we may be protected, and in helping to provide them with the requisites of public health—food, shelter and clothing—we provide the very first requirements of self-preservation."

Difficulties to Overcome.

By S. S. Jones, Esq.,

Editor Carbondale Leader, Secretary Board of Health of Carbondale, Pa.

Ever since the fateful morning that witnessed the forced and presumably hasty exit of our first parents from the delightful garden—their first home—man has had no lack of tangible ills to worry over. Immediately following his eviction he was ordered to maintain himself by his own exertion, forced to toil and perspire, with no immediate reward except, perhaps, the hunger-sauce that makes humble-pie palatable. Man's difficulties are supposed to have commenced with the knowledge that he was for the remainder of his life to shift for himself, and they have continued to come in one form or another ever since. These every-day trials have served to develop every peculiar phase of human character, yet all the inhabitants of the world may be grouped in three classes, viz: First, those indifferent mortals who avoid difficulties for the reason that work is extremely distasteful to them; and any condition that insures freedom from toil and the payment of municipal taxes usually satisfies this ambitionless class.

Second, the chronic grumblers—the men who are so blind to their best interests that they never see anything but difficulties, yet in some inconceivable way they are possessed with the idea that they have inherited all there is of value in the whole world. Among this class of dissatisfied mortals may be found men and women who surround themselves with every luxury that money will procure, but invariably refuse to join in a movement by which their less fortunate fellow-men may share, in some degree, what purely selfish men enjoy. This class furnishes the obstructionists and so-called high kickers, who are always ready to oppose every movement in which the masses have a reasonable right to be interested.

Third comes the broad-guaged, public-spirited, progressive man, who believes that it is man's first duty to take care of himself and his neighbor at the same time. These men court difficulty, laugh at the obstacles set up by chronic fault finders, fill with the enthusiam the indolent, shiftless drones who burden every community, convincing the doubting ones that difficulties are but angels in disguise, with whom a wrestling match would prove advantageous and secure to the victor temporal blessings innumerable. It is in this division of the human family that the active reformers are to be found—men who have no

time to celebrate a dead past, who have time and tireless energy to devote to a living present.

Among the various agencies now at work in this and other lands, having for their object "making life worth living," none deserve from the people, and from all the people, such hearty co-operation and practical assistance as the organizations working under the direction of the State Board of Health; but men who engage in this line of reform work soon learn that the people in many localities refuse to take kindly to the rules, and are far more ready to hinder than help in a matter of such vital importance to the public.

There is reason to believe that sanitary reforms, wherever attempted, are always attended with serious difficulty; and the size of the obstacles that obstructionists place in the way of the reforms are usually proportionate to the work undertaken.

It has been the experience of at least one board of health in this Commonweath, that sanitary regulation demands of the men engaged in it a vast amount of hard labor and exercise of every virtue enumerated in the code.

It is all well enough in theory to talk about men who have the courage of their convictions, who are willing to sacrifice personal popularity, business prospects, everything but the hope eternal, in order to insure the success of sanitary reform; but the fact is that there are few localities on this sphere that can furnish enough of the particular kind of timber necessary to stiffen the spinal column of the majority when the local board of health finds that conditions exist which demand that sanitary laws be enforced regardless of the high character, political power or social standing of the men who neglect or refuse to comply with the results.

In communities where the surface signs indicate indifference to the ordinary comforts of life, a low order of civilization is generally found. The exterior marks are a pretty safe guide in talking up the special requirements of the community when the subject is discussed at a meeting of the local board, or at a convention called to discuss sanitary questions; but the difficult work begins with the first attempt to put in practice the reform-work suggested, to inaugurate the changes proposed. At first the movement may not meet with very decided opposition, but it likewise receives little encouragement, and when it is found that all classes come under the law, the new departure becomes decidedly unpopular.

One of the strange freaks in human nature is discovered only when uniformity in sanitary observations are sought after; when an inspection reveals to the self-satisfied householder that his premises require quite as thorough work as does the home of his neighbor of whom he has complained. Every locality has its quota of "very clean residents," who are loudly in favor of the general cleaning until they find them-

selves included in the number who must comply with the rules. The notice to "clean up" is a positive crusher to such people, for they imagine that they are better judges of sanitary requirements than the members of the board of health, and, once aroused, these very nice people frequently become the pronounced enemies and bitter opponents of systematic sanitary reform. Plain, unvarnished truth is good medicine for one's neighbors, but for the neighbors only.

The people as a rule have much to do in the way of creating sentiment for or against every reform movement, it is only the mob who declare all sanitary law contrary to public policy. The great mass of people, however, are peculiarly unfortunate inasmuch as they are either unable or unwilling to see and admit the advantages of thorough and systematic sanitary regulation. They object to the restrictions and condemn the departure as an innovation that interferes with their rights as citizens of a free country. Such is in substance the foolish claim of many otherwise intelligent people, and nothing short of practical demonstration by enforcing the laws will convince this class of citizens that they hold erroneous views of sanitary work. The opposition of the masses is of course the chief obstacle that reformers meet with, and the conservative men engaged in sanitary reforms argue that the prejudice can only be overcome by educating the obstructionists until their eyes are opened and public sentiment drifts over to the side of right and practical reform.

Creating sentiment in favor of sanitary regulation is decidedly slow work in communities where an element that will not be convinced holds the reins of government, where many of the public offices are occupied by men who are too stupid to comprehend the wisdom of sanitary measures and too cunningly politic to permit the existence of a department of the public service that they cannot completely control. The opposition to the maintenance of the board of health in this city was confined to the minority party in councils when the department was first created, but the opposition has grown during the year and a half of the board's existence, and this is due entirely to the activity of the members of the board and their effort to administer the laws as they believe it to be their sworn duty. They do not discriminate in enforcing the rules, and men in authority are not, in their opinion, entitled to privileges that the common people are denied. Among the first to refuse to comply with the rules was a member of the upper branch of council, one of the largest owners of realty in the city, and when he learned that the sanitary department was no respecter of persons, he tried to get even by cutting down the item of the health department in the general appropriation ordinance, and just at present he is likely to succeed in his scheme. This is one of the difficulties that is, perhaps, confined to this city.

In several instances where it has become necessary to commence pro-

ceedings at law against persons who violate the local ordinances, the local courts decline to give the board the support it is entitled to. One of our aldermen recently ruled that connecting a wash-bowl drain-pipe with the public sewer was fully complying with the notice to connect the premises with the pipe line, allowing the closet drainage to continue to empty into a vault which he had been directed to abandon. In a number of instances, where clear cases for conviction were brought, the court refused to impose the fines, and discharged the parties arrested. But this order of difficulties is being overcome gradually.

Physicians, too, are given to helping the kickers occasionally in order to please their patrons, and contagious disease cases are not reported promptly; but the doctors are easily managed when they learn that the law has been violated and that the board means business.

Now, these are simple instances of the difficulties that are met and overcome, and show, too, how little consideration is shown the board of health in one city of this great Commonwealth by the local authorities and the people with whom the members of the board come in contact. The same difficulties doubtless confront other boards, but these of which we know we have described. The time will come when trifling obstacles will vanish and difficulties will no longer stand in the way of perfect sanitary regulation.

This happy condition may be expected very soon after the people, feeling the need of perfect drainage and cleaner surroundings, will come together and by concerted action secure for themselves what the members of the sanitary organizations have for years been trying to provide.

Compulsory Domiciliary Quarantine against Diphtheria.

By J. H. Montgomery, M. D., of Erie.

During the early part of February of the present year, considerable space in the daily papers of the larger cities, was devoted to the discussion of the recent appearance of typhus fever at one of the large seaports, and the probability of the disease spreading.

Typhus fever had just appeared in New York, attacking a number of newly arrived immigrants, mostly Russians, who made the trip in a densely crowded steamer. It was afterward learned that many of these people had spent some time in lodging-houses containing typhus fever patients, previous to embarking for America.

With the first outbreak of the disease, the New York Board of Health at once took active measures to prevent the disease spreading. All the

immigrants were traced as far as was possible, and as many as possible were placed under quarantine, until the usual period of danger was passed, and all cases of the disease removed to the hospital for contagious diseases. All premises occupied by typhus fever patients were thoroughly and carefully fumigated by the officials of the New York Health Department, and every vessel arriving from a port where typhus fever was prevailing, was quarantined and fumigated before being permitted to approach the city and land her cargo.

Owing to the strict measures employed, there have been but few cases outside these immigrants. The additional cases have occurred among those exposed to the disease in patients in the hospital for contagious diseases, so that practically the epidemic was limited in extent and confined to a small area, viz., the island in New York bay, whither all the typhus cases have been removed and where they now are. Up to March 18, there had been 155 cases, with 26 deaths, a mortality of about 16.8 per cent.

Typhus fever is a disease requiring considerable exposure before contracting it. The crowding together of those sick with the disease seems to intensify the poison and to render its transmission more likely. It is directly contagious, and is transmissable by the atmosphere, though, as abundant evidence goes to show, only to a limited extent, perhaps only a few feet. It is probable that the poison can be conveyed by clothing worn by patients suffering from the disease. At any rate, it is not the most contagious of the contagious diseases.

The mortality of typhus fever is variously stated to be from 10 per cent. to 18 per cent. Murchison states, that, after excluding deaths resulting from sequelæ, the mortality is about 10 per cent. Among chil dren, the death-rate is remarkably small.

Collie, of London, gives the following:

London Fever Hospital, up to age of 14, 1.78 per cent. (Ency. Dis. Child., vol. 1, p. 501).

Easton Hospital (Fever), up to age of 14, 1.76 per cent.

Southwestern Hospital (Fever), 3.84 per cent.

For purposes of comparison, let us look at the percentage of deaths occurring among the other severe contagious diseases:

Yellow fever, 50 per cent. (Bemiss, New Orleans, Pep. Sys. Med., vol. 1).

Yellow fever, 29 per cent. (Guiteras, Charleston, Ency. Dis. Child., vol. 1).

Yellow fever, children, 10 per cent. (Guiteras, Charleston, Ency. Dis. Child., vol. 1).

Small-pox, 15 to 50 per cent. (Hyde, Pep. Sys. Med., vol. 1).

Cholera, 50 per cent. (Stillé, Pep. Sys. Med., vol. 1).

The mortality of children from small-pox and cholera I cannot find expressed in figures. It is stated to be very high in small-pox, decreas-

ing with the age of the patient. The above figures are only an average, and will be found to vary in different epidemics.

The disease first spoken of, typhus fever, was vigorously combated at the beginning of the recent outbreak in New York, and with success, so far as preventing its spreading either over a large area or among people beyond those necessarily exposed to the disease.

Were a case of small pox, yellow fever, cholera or typhus fever to appear in any city or town, the proper authorities would at once remove the patient to a hospital for contagious diseases, or, in the absence of such a building, would isolate and quarantine the dwelling entertaining such a case. All persons exposed to the disease would be quarantined until the usual period of incubation was past, and, after the recovery, the premises occupied by a patient would be thoroughly and completely disinfected and fumigated by the best-known means before it would be again occupied. The consent or wishes of the patient or landlord would not be asked. Very little opposition would be offered; in fact, assistance rather than opposition would be offered to render the abode free from the risk of contracting a dangerous disease. Were such precautions not taken by our sanitary and health officials, severe censure from the press and public would follow the neglect of those in authority to prevent the spread of the disease.

Since September, 1891, our city has been visited by an epidemic of diphtheria, there having been from September 21 till March 25—according to the records of the health department—261 cases, with a total of 105 deaths from the disease, giving a mortality of 40 per cent. This is larger than the mortality of typhus fever, which, in the present epidemic, was 16.8 per cent., and, as a rule, is not over 18 or 20 per cent.—about equal to the average mortality of small-pox, though probably less than it would be in small-pox patients of the same age—greater than that of yellow fever for the corresponding age, and about equal to that of cholera. It should be borne in mind that this mortality of 40 per cent. was only for this particular epidemic. In some epidemics it would doubtless be less, in others greater. Jacobi, of New York, is authority for the statement that in some epidemics it reaches 95 per cent. (Pep. Syst., vol. 1, p. 692). If this be true, we know of no disease that may be attended with greater fatality than diphtheria. All the diseases against which such strict sanitary measures are directed to prevent their extension—viz., small-pox, yellow fever, cholera and typhus—are infectious, communicable and contagious. The poison can be transmitted by the atmosphere, is capable of clinging to inanimate objects for an indefinite length of time, and then, under suitable conditions, developing again.

In comparison with the characteristics of these dread diseases, let us see what diphtheria has in common with them. Jacobi states: "Hardly any disease clings so tenaciously to solid and semi-solid bodies, and, in this way, is transmitted even after a long time. Hardly any disease

clings so tenaciously to dwellings and furniture. It can be transported through the air—though probably not to any great distance—certainly transmitted by spoons, glasses, towels and handkerchiefs used by the patient." . . . . "The character of the disease communicated and local manifestation do not depend on that of the original sufferer; thus, mild cases may produce severe, and *vice versa*."

Practically, then, diphtheria is a disease that is contagious, infectious and communicable—as we know the other so-called contagious diseases to be—and is attended with a mortality almost as great.

Let us consider for a moment what course would be pursued were a few cases of small-pox or typhus fever to suddenly appear in the midst of a community—a possibility at almost any time—and, for purposes of further comparison, let us make the same inquiry concerning yellow fever or cholera, which, fortunately, is not probable, except at a seaport.

In response to this question, the reply of ninety per cent. of the people would be, in substance: "Remove such cases to a pesthouse or hospital for such diseases, if one exists; if not, isolate the patient and all who have been in contact with him, until all danger of the disease developing in those exposed is over. Disinfect and fumigate the dwelling, and do not allow anyone to occupy it until such precautions have been taken." Why are such precautions necessary? may be asked. The substance of the reply would be: "Because these diseases are certain to spread, unless the proper measures to prevent are taken at the start, and are attended with great mortality; and unless the necessary precautions are taken, an epidemic of the disease is sure to ensue, and many deaths result, the mortality of these diseases being great."

It has been shown that diphtheria is a disease infectious, contagious and communicable, and, like the others, its poison has the power of clinging to various objects—such as clothing, furniture, bedclothes, playthings, etc., for an indefinite time, and then re-developing, thus causing new epidemics of the disease; its mortality is greater than in typhus fever, as great as in small-pox, yellow fever or cholera, and in some epidemics may even be greater than in these diseases.

What should we do when diphtheria appears in our midst? Have we taken the same precautions to check its spread as we would if typhus fever, yellow fever, small-pox or cholera were to appear? No! Is it not practically as contagious and the cause of as many deaths as any of the other infectious diseases? Yes! Have we been careful to isolate cases of the disease at the start, and quarantine those exposed, until danger was passed? Have we carefully and thoroughly disinfected and fumigated infected dwellings before permitting them to be again occupied? In fact, all efforts in this direction have been greatly resisted, and the disease soon spread to a point beyond control.

Contrast for an instant the apathy and indifference shown by the public in taking the proper steps to prevent the spread of this fatal disease

and the interest and anxiety to check the spread of the other diseases that are commonly called contagious. Were the same indifference and neglect shown in cases of small-pox, typhus fever, cholera and yellow fever, extensive epidemics would follow, and countless lives would be lost, which are now saved by the enforcement of sanitary measures Instances have been known where the public, during the prevalence of an epidemic of diphtheria, were content to sit with folded hands and see child after child die, and even go so far as to refuse to assist sanitary officials acting in an official capacity to prevent the disease spreading. The public were rewarded by seeing the disease spread, and numbers of children carried off who might be living to-day, had the epidemic been checked. What should we do when diphtheria makes its appearance? There is but one answer: To use exactly the same measures as would be employed against the other contagious diseases having a high death-rate, and which spread rapidly unless vigorously combated at the first outbreak.

Completely isolate the very first cases; quarantine every exposed person; until all danger of the disease developing in those exposed is over. Fumigate thoroughly the dwelling occupied by such a case, before permitting it again to be occupied. Prompt removal of the first cases to a special hospital, with quarantine of those exposed, would effectually check the disease.

Diphtheria being essentially a disease of childhood, there would doubtless be a popular prejudice against forcible removal of the little sufferers from the mother's care, and it is doubtful if a law to this effect could even be enacted. Fortunately the same object can be accomplished by another method, and one that is applicable to every community however small—viz., complete isolation and quarantine of every dwelling containing a case of diphtheria, until it is well, and until sufficient time has elapsed for all exposed to be free from danger; complete and thorough fumigation of the dwelling, and destruction by fire of all clothing and bed-clothing used by the patient during the attack. That complete domiciliary quarantine of a house or houses containing an infectious disease is possible and practicable, has been repeatedly shown. An instance fresh in the minds of many is the outbreak of small-pox a year since at Johnsonburg, Pa.; here compulsory quarantine was rapidly enforced, and the result was that the epidemic was quickly suppressed.

To obtain this end, the willing and hearty co-operation of the public with physicians and sanitary officials is absolutely necessary, and this alone is not sufficient. We must have the laws necessary to accomplish this enacted, with full power to enforce them, and sufficient appropriation to defray the expense entailed. In no other way can the necessary isolation and quarantine in an epidemic of diphtheria be obtained, and this is the only method by which we can hope to eradicate this disease,

as we have done with small-pox and the other infectious fevers. In a very brief time the good results accomplished would teach the public to regard diphtheria in its true light, as being equally dangerous as the other dread diseases, and their hearty assistance would be given our officials in their good work. Until we secure this power and the means to accomplish it, we will see diphtheria spread and countless lives sacrificed—many of which would have been saved, had the disease been vigorously combated at the outset by that good system of Compulsory Domiciliary Quarantine which has been so successfully employed in infectious diseases.

THE PREVENTION AND QUARANTINE OF SCARLET FEVER.

By E. Cranch, M. D., *Erie, Pa.*

Although this paper is to treat of so inflammatory a subject as scarlet fever, it will not be necessary to use any inflammatory language, or to magnify the subject; it is only intended to attract attention forcibly to some wholesome and unwholesome truths in regard to scarlet fever and its sanitary management. It is admitted by all that scarlet fever is abroad in the land, and that it is in the highest degree contagious; that it spreads by contact, by air, by clothing, even by letters and books, and certainly by dogs and cats and other domestic pets, such as toys and house flies, in their migrations from house to house.

Two or three cases, well known to the writer, will illustrate the ease of its transfer from an infected house to any unwary by-traveler or visitor who happens to be susceptible to its blandishments. Of course, one who has had it, does not need to fear its effects, beyond the chance of a sore throat, generally absent and seldom severe. But all visitors, and especially attendants, may act as carriers from the sick to those who have never had it.

Let no one speak too lightly of it, though so many cases are and have been light, for who knows how soon its blasting touch may wither the fairest blossom in the garden of our hopes, or how soon its scarlet conflagration may be a signal of devastation in some happy home, causing the grave to yawn for the best beloved of many a household. God grant that its ruddy terrors may be held in check for us, and that its baleful torch be not lighted on our hearthstones.

To show the way to turn it aside, to show its burning destruction, is in some measure the object of this paper, not alone by the essay itself, but still more by the discussion that it is earnestly hoped and intended may follow this appeal to caution.

Well, the cases of contagion alluded to were these: first, a boy living in the country was sent a long way off to bring home a goat, and was charged to avoid a certain neighbor's house, where scarlet fever was in full possession. Going out, the obnoxious house was easily avoided, but on the return the goat was willful and insisted on dragging the unlucky youth right over the porch of the prohibited mansion, when just then the door was opened, and a full breath of the tainted air inhaled by the panting driver of the wicked goat. It was only a whiff, but it did the business, and in one week little Jabez justified the bad omen of his name by "bringing sorrow" in the shape of a fine case of scarlet fever.

Another case was contracted by waiting on the doorstep of a house and then joining a caller, who had only gone in for five minutes, but long enough to bring out a supply of scarlet-fever poison in the air that clung around him. One more case was that of a young girl whose mother had a dress come home from a house where there was a recent case of scarlet fever. The dress was undone and tried on in the little girl's presence, and in a week she had the fever, with no other possible source of its infection. The poison is one of the most diffusive of all, and easily retained by the clothing, furniture, carpets, walls, etc., of any room it has been in. Yet a closed door *may* be enough to keep it in a room or house, and a few minutes in the open air *may* be enough to scatter it free from the clothing, but in all such cases there is more or less risk of contagion.

Very much to be dreaded is this quick, subtle, yet evanescent poison, for it has done much to fill our cemeteries, our deaf-mute schools, our insane asylums and our hospitals for chronic diseases.

In the hope that strict isolation and preventive measures may some day make the scarlatina or scarlet fever or scarlet rash (for these are only names of the same disease) as comparatively rare and as much under control as the dreaded small-pox, the subject of prevention will now be spoken of at some length.

Prevention, or prophylaxis, includes both prevention by medicine or disinfection, and isolation or quarantine. We will speak first of medicines that may be taken to lessen susceptibility, and reduce the chances of contagion to those taking such medicine. In the case of small-pox, the use of the modified virus of a kindred disease known as cow-pox, has long been used by inoculation, called vaccination, to prevent or limit the violence of the true small-pox. But the inoculation by the blood presents so many dangers in the way of the introduction of animal diseases and septic virus, that the only safe mode of practicing such protection seems to be the exhibition of the modified virus of the cow-pox by the mouth—experience showing that the digestive juices resist the complicating poison better than does the actual blood of the scarified or "vaccinated" arm. Just so in scarlet fever; it is obviously not possible

to safely inoculate the blood with any modification of so subtle a poison, but in a kindred vegetable poison, the juice of the deadly nightshade, belladonna, we find at once a preventive and a remedy for the great majority of cases.

The mistake commonly made, and the most frequent source of failure in the use of the potent belladonna as a preventive or as a remedy, has been and always will be the using of belladonna too strong. It must not be given, as some have tried it, in doses of the extract sufficient to dilate the pupil of the eye; but let it be given in an infinitesimal portion, such as is found at the homœopathic pharmacies under the name and rank of the two hundreth potency of belladonna, and let a dose be given once or twice a week during the exposure, if in the same house, or once a month if only in the neighborhood, and the disease will either not be taken or its manifestations will be slight.

In all cases, however light, the same care and watchfulness are always needed to guard against possible complications and sequelæ. Prevention includes, further, such means of disinfection in the house and room as will lessen the violence of contagion, and at the same time not be injurious to the patient.

The burning of sulphur is valuable; but, as Dr. Squibb has pointed out, no thorough work is done by dry sulphur smoke: it must be rendered moist by the presence of the vapor of water. Dry sulphur smoke does not seem to lay hold of the germs: but it may be easily moistened in this way: Stand the dish or can containing the sulphur to be burned in a dish of water, or in a dish of wet sand, or let water be boiling on a stove close by: and by these means you will be able to vaporize enough water to moisten the sulphur fumes and render them sufficiently active.

It is proper to protest against the burning of sulphur or of any acrid smoke in the presence of the patient. The makers of Spencer's fumigating pastilles, which contain a portion of bichloride of mercury, claim that they may and should be burned around the sick bed; but personal observation has proved that much harm may result from such poisonous fumes. Although the patient may tolerate them, it is because sensation is lessened in such cases, for those who speak of it say they have felt a swelling and aching of the throat, and a manifest increase of fever, as the effect of using the pastilles too close. If boards of health are to have unlimited power, let them be very sure of their facts, for the experience of to-morrow may, as it often does, upset the theories of to-day, and condemn the practice based on such theories. The physician should be progressive, and feel tied to no rules so fast that he will not give them up if he sees a better way.

Another very useful disinfectant in the sick room, as well as near it, is the solution of the chlorides known as Platt's chlorides. It may be used by cloths wet with it hung up round the room and over the doorway of the

room, and used to wet the carpets and clothing when these are brushed and scoured.

Still another plan proposed is the burning or vaporizing of eucalyptol and turpentine. These may be useful, but at the same time must be used with caution about the scarlet fever patient, for fear of irritating the lungs and the kidneys, which are peculiarly sensitive to these pungent agents.

Penciling the throat and nose with antiseptic applications is also of very dangerous utility, it certainly cannot destroy the contagion, and it may be of great danger to the patient.

All personal discharges from the nose or mouth and elsewhere should be at once burned up or promptly disinfected, but the body of the patient cannot safely be subjected to such treatment.

The value of fresh air in the house and room is incalculable; fresh air and sunshine will destroy all the poison as quickly and more safely than many of the common disinfecting agencies. Sufficient warmth must always be had, but fresh air is imperatively demanded. All dishes and clothing used should be kept separate and cleaned by themselves. Persons in attendance on scarlet fever, however thoroughly they may have had the fever themselves, are frequently liable to a sore throat, often of a diphtheritic character, for the poison seems always first to attack the throat. This secondary sore throat may itself be contagious, though slight in itself, and therefore is a proper source of solicitude.

An occasional gargle of water containing alcohol or brandy, and the daily use of a dose of belladonna 200th, will generally prevent such sore throat.

Let as few as possible be around the sick with scarlet fever, and exclude all visitors, even those who may have had it. Let those who go out to work, or to purchase for the family, be others than those who nurse the sick in the house, and let the city and the physicians see that no one suffers by too great isolation; no starvation or cold should be forced on any household because of the necessity of protecting other citizens. But no good end is ever gained by concealing the fact that scarlet fever is present, and the placard should make the fact public. When inmates of an infected house are abroad, they should avoid crowded places until they have been some time in the fresh air, or have exposed themselves to the vapors of moistened sulphur smoke.

In regard to schools, it is proper that children from a scarlet fever house be kept at home long enough to be sure they will neither have it themselves nor carry it to others. Most of the harm in spreading the disease is done by letting the little patients out among their playmates before they have fully recovered.

We are now right in the consideration of the last form of protection—quarantine, with its necessary isolation. The Academy of Medicine of Paris, France, in 1882 adopted a rule fixing the period of isolation proper

for scarlet fever patients at forty days. At the same time they ordered that other diseases should be kept by themselves, thoroughly isolated, as follows:

Small-pox, forty days; chicken-pox, twenty-five days; measles, forty days; mumps, twenty-five days; diphtheria, forty days; followed by bathing and change of clothes, the old clothes to be baked, fumigated and scoured before subsequent use. The custom in Erie is to observe a much less period of isolation, often too much less, with great danger of spreading the diseases. Several oversights have prevented the writer of the present paper from cabling to Paris for advice as to whether these rules of isolation are still in force, but it is presumed that they are.

One very important reason why scarlet fever should be so carefully isolated even by aid of placards on houses, which have not yet been used in Erie, is the fact that any case of scarlet fever, known by other names, as scarlatina and scarlet rash, may give rise to, or be complicated with, diphtheria; and it is a fact capable of the strongest proof that many cases reported solely as diphtheria are in reality forms of scarlet fever, while the results are just as fatal and as disastrous as in diphtheria of any other form.

This relation of the poison of scarlet fever to the production of diphtheria is not enough known to the public, for it is a fact that any case of scarlet fever may have or may give rise to diphtheria in its worst forms. And it is important to recognize this, for scarlatinal diphtheria is not only just as dangerous as common diphtheria, it is even more dangerous in its liability to affect the kidneys, or to be followed by extensive ulceration and sloughing of the throat and ears.

Scarlatinal diphtheria also often demands a different treatment, and one child at least is believed to have died a victim of diphtheria, the fact that it was caused by scarlet fever not being known till after death, when the next door family was found to have had scarlet fever, but thoughtlessly or wickedly kept it concealed. How important is it then that every case of scarlet fever should be most thoroughly known, by report and by placard, and the quarantine enforced a sufficient number of days to be effective. It is not to be denied that light cases will always be apt to escape notice or recognition, and so keep the disease going, but it is none the less our duty to keep up the reporting, placarding and isolation of all known cases of scarlatina and the administration of the homeopathic dose of belladonna to well neighbors as a preventive.

Forty days may seem an unreasonable long time to isolate a case that may be well long before the forty days are over; but when we think of the peeling of the skin that follows scarlet fever, and the terrible results that are liable to occur from a lack of caution during convalescence, both in the shape of danger to the patient and danger to the neighbors, and

the certainty of contagion to all concerned who are in any way susceptible, it seems as if forty days were none too long a time to keep the patient himself secluded, although under proper precautions of fumigation by moist vapors of sulphur and plenty of fresh air, other members of the family may be permitted to go about as usual, before the expiration of the forty days. All books, toys and clothing used during the period of isolation should be removed, destroyed, or thoroughly baked and disinfected, the walls of the room may be rubbed with slices of fresh bread, to remove all germs, and then newly papered, whitewashed or calcimined before new tenants are allowed.

It is not the place here to say much of treatment, only to call attention to the dangers of taking cold, the great and often fatal dangers of the external use of cold water, in baths or cold packs; the danger of the common chlorate of potash, as liable to bring on fatal inflammation of the kidneys; and the importance of calling a physician early in the case.

As a parting word, remember that scarlet fever, besides its own many and great dangers of deafness, dropsy, stiff joints, etc., may have with it, or give rise to, the worst forms of diphtheria, and that belladonna 200th and complete isolation are its best preventives.

The Enforcement of Sanitary Rules.

Beriah Edwin Mossman, M. D., Greenville, Pa.

Mr. President and Gentlemen of this Convention: In the short space of time allotted me, I desire to say a few words on the subject of sanitary legislation and its enforcement. It is a subject that has received any amount of attention from sanitarians in this State for many years, and is yet far from being settled in a manner satisfactory to the minds of medical men and those interested in sanitary science. It is the foundation upon which all our work must rest. Without good sanitary laws it will be impossible to have thorough organization that will reach every town and borough in the State.

A careful review of the laws relating to hygiene on the statute books of the Commonwealth of Pennsylvania shows that considerable legislation has been passed, with a view to the protection of the public health. The first act was passed January 22, 1774, over one hundred years ago. (MS. Laws, chap. 289.) Since that time numerous acts have been passed, some of a general character, and some special laws relating to certain municipalities. The whole mass of legislation is, to a great extent, of a desultory character; and while many of the acts are truly valuable, they need trimming and amending, so that they may apply to every incorporated borough or city within the limits of the State.

The most important act was passed June 3, 1885, which created the State Board of Health. Nearly all the existing boards of health throughout the State were organized under the laws of May 23, 1874, relating to cities of the third class—that is, cities of between ten and one hundred thousand people. The law regulating the sanitary powers of boroughs was the act passed April 3, 1851.

This law places in the hands of the burgess and council sufficient power to maintain a good sanitary condition within the borough limits, but as no one officer is given special power of responsibility in the matter it is neglected.

In cities where the councils have authority to create local boards of health and appoint health officers who are compensated for their services, the sanitary laws are generally well carried out and the people receive the benefits therefrom, but this cannot be said of the boroughs that come under the act of April 3, 1851. I do not believe there is a borough in the State of Pennsylvania that is in a good sanitary condition, and the most of them are run regardless of any attention to the provisions of the act regulating the sanitary affairs of such corporations.

It is the custom in boroughs to appoint a street commissioner, whose duty is to clean the streets and alleys and superintend all works of construction within the borough limits. Complaints must usually be made to the burgess or council by the citizens who have any grievances they desire to have settled or any complaints to make about the sanitary condition existing in their locality. The private citizen must become either actually or substantially a prosecutor to accomplish what should be done for him by some responsible official. It is usually the duty of the street commissioner to attend to all complaints that are made or brought before the burgess or council. Existing evils are seldom corrected, and a deplorable condition of sanitary affairs invariably exists in most incorporated boroughs.

Sanitary organizations and work are almost entirely confined to municipalities, and there is an absence of any active interest taken in many places where local boards of health exist, and at the same time it is proper to state that in a number of incorporated cities of the sixth and seventh classes there are no boards of health or health officers. In many large-sized boroughs typhoid fever is present all the year round, seldom ceasing, and at times prevails to an alarming extent with many fatalities. The same can be said of visitations of scarlet fever and diphtheria that have assumed in interior towns almost an epidemic form, and have wiped out some families entirely. Efficient boards of health in such places would soon command the situation, and the enforcement of existing sanitary laws would arrest the progress of contagious diseases and save many lives that are unnecessarily sacrificed.

The evils existing in all large sized boroughs are many, and to express my views clearly before this convention I will present the condition of one of our most thriving boroughs in the Commonwealth.

The place has 9,000 population and is a busy, thriving manufacturing town. It has no board of health or health officers, and the only person who takes any interest in the sanitary condition of the place is the street commissioner. Over 1,300 children daily attend the public schools. There is no sewerage and very poor surface drainage. The streets are not paved and are in very bad condition. Every spring the accumulated filth on the streets and alleys is carried off and some fresh road material is carted on. The back yards and alleys are made to receive the deposits of wash-water, dish-water, and all the refuse of the kitchen. In some few instances cesspools in the yards receive everything, including the pipes from the water closets, but most commonly the fearful, old-fashioned water closet stands in the back yard a source of terribly offensive gases In this place typhoid fever is almost always present, diphtheria every season claims its many victims, and scarlet fever is generally present with its quota of deaths.

Too little regard is paid to the prevention of the spread of contagious and infectious diseases in rural districts by physicians and those in whose homes the disease exists. An effort is commonly made to conceal the fact of the presence of the disease both by parents and physician. Denials are made and neighbors exposed carelessly to infection. Scarlet fever, diphtheria and typhoid fever are concealed from the public. No notice is posted on the house as a warning, nor are there any quarantine measures taken. This is not right and should be held as criminal. Infected houses as well as disease-breeding yards, vaults, wells, drains, cesspools and other nuisances on private premises should be placed under strict sanitary police surveillance. It is unnecessary for me to comment upon such a state of affairs as every sanitarian well knows what should be done. This description of a growing, thriving town is but one of many such in the large State of Pennsylvania. Borough officials are commonly ignorant of the great powers invested in them by the act of 1851, and seem to labor under the impression that the only duties resting upon their shoulders are to see that the streets are properly lighted, mud holes filled up and crossings put in.

It takes time to accomplish all great works, and it will take time to place all the cities and boroughs in the Commonwealth in excellent sanitary condition. It can be done, and will be accomplished in the future, and this great task will have to be the work of the State Board of Health. Through this body local organizations should be established in every incorporated borough in the State. If the act of April 3, 1851, governing boroughs does not confer the power upon the burgess and council to create boards of health, let an act of general character, embodying all that is necessary, be presented to the Legislature. It is the

duty of the State Board of Health to see that every borough has a local board or an active health officer, and this can only be accomplished by having the existing laws carried out, and wherein they are deficient so amended as to meet the requirements. This once accomplished, and every local board, municipal and borough, working uniformly under the laws and maintaining satisfactory relations with the State Board of Health, the great objects aimed at by the creation of the State Board of Health, and the enactment of the sanitary laws, will be secured.

I would suggest that the State Board of Health draw up a bill to be presented to the Legislature at the next session of that body, in which will be embodied a provision for the appointing of a board of health or health officer in every incorporated borough or township in the State of Pennsylvania, defining the powers or duties of such boards of health or health officers, and that the borough or township compensate such boards of health or health officers for their services, and that such boards of health or health officers work, under and in co-operation with the State Board of Health, as specified in the act of June 3, 1885, creating the State Board of Health. This bill should require the registration of births and deaths throughout the Commonwealth. In other words, a complete and satisfactory, general and uniform law should be made that will cover any point needed to establish a harmonious and systematic system of sanitary organizations in every city, borough and township in the State.

The Sanitary Utilization of Garbage and Refuse, and Destruction of Germ-life in Infected Material, Without Injury to the Article Treated.

By I. M. Simonin,

Civil Engineer, Philadelphia.

Gentlemen: The criminal, objectionable and unsatisfactory methods now employed in disposing of the garbage and offal of cities, and the primitive means used to prevent the spreading of contagious diseases, by the destruction of the least valuable of the infected material, and the feeble attempts made to disinfect that which seems too valuable to burn, are too well-known to the members of the State Board of Health to be enlarged on by me. The remedy for these evils, we think, is supplied by the process covered by letters patent, granted January 5, 1892, to I. M. Simonin, C. E., and C. F. Simonin, for utilization of offal.

The Simonin Process that it is my pleasure to bring to your attention, has been in operation for over two years, at Providence, and since that time many improvements have been added, and it was not until the same was perfected, both from a sanitary and financial point, that it was thought wise to make the process known to the public. During all this time the health officer of that city, Dr. Charles V. Chapin, has promoted the enterprise, both by advice and time, and to him much credit is due.

This process not only disposes of the offal in a sanitary and inoffensive manner, but also effectively destroys the germs of all diseases, without any injury to the material treated, but which on the contrary is improved by the treatment. In case of an epidemic, this apparatus can be controlled by the Health Department, and used to disinfect, thoroughly and effectively, all infected materials. By this process the offal (garbage, dead animals, etc.) is not only treated without rehandling or sorting in a sanitary manner, but the materials are converted into plant-food and grease, both being valuable and necessary for the growth of the country.

This plant-food is known to the trade as tankage, and finds a ready sale. The average of the monthly analyses, covering a period of one year, made by Messrs. Stillwell & Gladding, Chemists for the Produce Exchange, New York, shows that the tankage contains 5 per cent. moisture, $4\frac{4}{10}$ per cent. ammonia, 9 per cent. bone phosphate of lime, and 1 per cent. of potash. The mechanical condition is perfect, and its dryness makes it of much value in the manufacturing of fertilizers, on account of the rapidity with which it will absorb any free acid or moisture present in the material with which it may be mixed. In itself, for many plants, it is a good fertilizer. The grease is used for manufacturing soap, candles, etc. The demand is unlimited, and the price is equal to that of greases of the same color. The industries in which these products are used are only in their infancy, and especially is this the case with the fertilizing trade. The demand for fertilizers is constantly increasing, and the sources of crude material do not increase in the same ratio.

The Quarterly Journal of Science says: "To economize nitrogen, potash and phosphorus—to recover these from waste—is the sacred task which chemists and engineers should take in hand. The reforms which shield us from pestilence, sink into insignificance compared with those required to guard posterity, in not a very remote future, from chronic scarcity."

The crops that a soil will produce are only limited in number by the amount of plant-food, water and temperature we supply it. The farms surrounding Paris produce from five to ten crops a year, and every crop many folds larger than that obtained from the most fertile soil in this country. To-day in Massachusetts alone, 906 farms are abandoned, each farm averaging eighty-five acres, and containing all necessary buildings for the comfort of man and beast. It will only be a short time before all the States will be suffering from the same trouble. The fertilizing material produced by this process contains every ingredient needed by plants, and if the offal of all cities was so utilized, plant-food would be so abundant and cheap that it would be within the reach of every farmer. Barren soils would soon be rich and fertile, waste places transformed into spots beautiful to the eye, and what was desolate and abandoned would be reclaimed and productive of much value.

The Simonin Process is simple and entirely a chemical one. Garbage is a mixture of water, and animal and vegetable matter. The percentage of water being about 80, and any attempt to remove this by drying before the treatment, would be fatal to the commercial success of the process, and besides would prevent its use as a sanitary measure. To deprive it of its water in a cheap and sanitary manner, we enclose as soon as received the offal in a large cylinder, tested to stand 150 pounds pressure. It is in this cylinder, completely immersed in a chemical re-agent, with which water will not mix, and which at the same time kills all germs of disease, and in addition acts as a solvent for grease, heat being used in the operation.

The specific gravity of the water being heavier than that of the re-agent, a large part of the water is accordingly displaced, and the balance passes off with the vapor of the re-agent and is condensed and separated therefrom. A series of these immersions causes not only a complete drying of the offal, but frees it entirely of grease.

The expense to cities or towns using this system would be less than cremation, and it can be introduced profitably in towns producing as low as five tons of refuse daily. It is estimated that this amount is produced by ten to fifteen thousand people.

I append to this paper a report on the Simonin Process, made January 27, 1892, by Dr. J. W. Prendergast, to the Board of Legislation of Cincinnati, O., he having been delegated by the city to examine all known processes in use in this country for the treatment of garbage. His report covers the work for the utilization of offal, but questioning the claims that liquid hydro-carbon—the re-agent used in this process—destroys germ life, especially if used cold, he had a number of tests made under his personal supervision in his bacterial department, and his report on the same justifies our claim. That there is need of a better sterilizer than that now in common use is not open to dispute, hot air not being able to be supplied at a sufficiently high temperature without injury to the material treated, to kill all germ life. It is the hidden germ, or the germ we cannot control, that causes pestilence and epidemics. Cremation, while effective in destroying germ life, still is liable to permit the escape of germs before the heat is sufficiently high to destroy this life. The mass treated must first be heated, then subject to destructive distillation, and finally ignited. The moisture and gases that escape must carry germs with them, the most improved crematories being open to this objection, for the draft cannot be obstructed, consequently the vapors cannot be controlled. To obtain an ideal process, all parts of the infected material must be acted on the same, and this can only be done by means of an agent that will penetrate all portions of the material. This, we claim, is accomplished by the use of hydro-carbon, either in the liquid or vapor state. It is an exceptional case when neither of these can be used; and in this case we have connected

with the same apparatus steam, which can be used, either by means of coils to heat the air within the cylinders, or it can be used as live steam, and, by means of valves, the heat and pressure kept under perfect control. The hydro-carbon used in the process is recovered, consequently the expense is nominal.

All of which is respectfully submitted.

APPENDIX A.

HEALTH DEPARTMENT.

OFFICE OF SUPERINTENDENT OF HEALTH,
CITY HALL, PROVIDENCE, R. I., *August 13, 1891.*

The Simonin Process for utilization of garbage has been adopted by this city, and it receives the unqualified approval of the health department.

(Signed) CHARLES V. CHAPIN, M. D.,
Superintendent.

APPENDIX B.

REPORT OF DR. J. W. PRENDERGAST.

THE SIMONIN PROCESS FOR THE DISPOSAL OF GARBAGE,
CINCINNATI, *February 23, 1892.*

To the Honorable Board of Administration:

GENTLEMEN: In compliance with your instructions, I have visited the City of Providence, Rhode Island, for the purpose of personally inspecting and investigating the process in use in that city for the disposal of garbage, and beg leave to submit herewith the following report:

Leaving here on the evening of February 5th and arriving at Providence on the morning of the 7th inst., I proceeded without delay to the garbage plant. It is located about ten minutes' walk from the center and rather to one side of the city.

Before entering I walked in every direction around the building to discover if there was any offensive odor proceeding from it, and I assure you that did I not know the nature of the business conducted therein I certainly should have been unable to distinguish from the sense of smell anything concerning the character of the trade.

The process has been in operation in the city of Providence for over two years. Improvements were being made constantly under the supervision of Dr. Chapin, the health officer of Providence, and it was not until January 5th of the present year, the day the patents were allowed,

that the inventors felt they were ready to invite the world to inspect and examine the product of their genius.

The first impression was an entirely pleasant and agreeable one, for the reason that there was an entire absence of any disagreeable odor whatsoever in or around the plant.

The process is simple and entirely chemical, and one wonders that the well-known principles applied here had not been thought of before.

It is difficult, without a diagram, to make lucid anything concerning machinery, but an effort will be made to briefly outline the principal features of this process:

Two large buildings are used, one for the machinery used in the utilization of the garbage, consisting of large iron retorts, vaporizers, condensers, settlers, purifiers, etc., and the other building is used as a power-house and storage wareroom.

The garbage, on arrival at the works, is immediately placed on small truck cars, built expressly for the purpose, and without any handling or assorting of the mass whatever, is at once run into these large iron retorts referred to above.

These retorts are immense iron cylinders, 18 feet long and 6 feet in diameter, and accommodate three cars. On the floor of each retort is a series of steam pipes and at the opposite end is a valve which permits the entrance of the chemical re-agent. At the top of each retort are numerous ingenious devices employed in vaporization. As soon as three cars are run into the retort the open end is hermetically sealed, thus preventing the escape of any odors or gases.

The object of the invention is a twofold one: first, to provide a commercially successful apparatus whereby garbage can be treated for the purpose of recovering from it the constituents which have a market value, and second, to effect this result without occasioning a nuisance and in a perfectly sanitary manner.

The chemical re-agent used has a less specific gravity than water and also has a solvent effect upon grease or fat submitted to its action.

Now the retort is closed and filled with garbage. The re-agent is then allowed to fill the retort and it has the double effect of dissolving the grease and displacing the water in the garbage. The mass is treated in this manner several times without removing it from the retort or even opening the end of the retort. It has the final effect of completely drying the garbage, and I have in my office samples of both vegetable and animal matter treated in this manner, at Providence, under my own supervision.

Two products are derived from the treatment of garbage by this process, namely: first, what appears to be a valuable fertilizing matter and a grease which I am informed meets with a ready sale. There are various condensers, settlers, re-agent-holders, purifiers, vaporizers, etc., used in the process, which, it seems to me, do not need any detailed description.

Such, in brief, is the Simonin Process and Apparatus for treating garbage.

Dr. Chapin, the health officer of Providence, who is familiar with every step of the process, and who, perhaps, has given as much time to the study of the garbage question as any other gentleman in the United States, unqualifiedly endorses this process.

Massachusetts being the recognized leader in sanitary matters, and Boston, the seat of culture, being an hour's ride, I felt it incumbent upon me to ascertain what her officials thought of this latest garbage process.

Durgin, of the Department of Health, while he feels that every householder should dispose of his own garbage, unhesitatingly recommends this method as the next best process.

Mr. Chas. Carter, a civil engineer and Boston's superintendent of street cleaning, also endorses it highly, and makes special mention of it in his annual report, which is just from the press.

Respectfully submitted.

J. W. PRENDERGAST,
Health Officer.

APPENDIX C.

DEPARTMENT OF HEALTH.

BUREAU OF BACTERIOLOGY, AND MICROSCOPY,
CINCINNATI, *March 15, 1892.*

J. W. PRENDERGAST, M. D., *Health Officer:*

DEAR SIR: Permit me, herewith, to submit, in compliance with your instructions, the following report concerning the germicidal action of naphtha.

My observations have been limited to the practical aspects of the question, both so far as the microscopic investigations are concerned, as well as the references to the literature of the subject.

In testing the germicidal action of naphtha I experimented with the more common forms of microscopic vegetable life which give rise to the process of putrefaction or are generated as products of this process.

It has long been held that all, or nearly all, of the coal-tar derivatives possess some disinfectant or germicidal properties. Among these chemical agents naphtha is said to have a specially high degree of bacteriocidal action. In testing the power of naphtha to destroy microscopic vegetable life, I selected putrefying substances which are most frequently found in the offal or garbage of the city, such as particles of meat, bone, potatoes, fruit of various kinds, parings, rags, etc. Since moisture or the presence of a small percentage of water is a condition favorable to the generation and development of the microscopic ele-

ments of decomposition, putrefaction or fermentation, I also subjected some of the fungi found in stagnant water to the action of naphtha.

I. The different kinds of mould fungi, found upon moist cellar-walls, etc., seem to be quite susceptible to the action of naphtha. I succeeded in completely stopping the growth of these fungi by exposure to naphtha. In referring to the literature upon the subject, I found a statement by Klebs, to the effect that the odor of certain coal-tar products will lower the multiplying power of the cells of the mould-fungi.

II. A particle of flesh in the incipient stage of putrefaction was found to serve as a culture-soil for at least three distinct kinds of vegetable organisms. Spiral-shaped fungi were seen in great number. Bundles and networks of them could easily be recognized. Besides these the microscope revealed some rod-shaped fungi and clusters of nucleated fungus cells. The specimen was exposed to the action of naphtha, and microscopic examination after the lapse of thirty-six (36) hours showed complete cessation of the fungous process. Besides the interruption of microscopic plant-life, there were evident destructive changes in the muscular structure of the specimen, due to the powerful action of the naphtha.

III. A piece of meat, in a state of advanced decomposition, was found to contain numerous forms of fungus vegetations. Some of these were identical with the organisms found in the preceding specimen. Besides these many new forms were seen.

Naphtha interrupts the growth of these fungi immediately. Some of the spiral-shaped organisms continued to grow for days after the exposure to naphtha, but finally there was entire absence of vegetable life in the specimen.

IV. Organic matter, deposited in moist places, which are practically inaccessible to light and air, will in the course of time, be found to be covered with a layer of dust, soot and mould. Under the microscope this layer presents many varieties of plant-life. Many of these fungi multiply with astonishing rapidity and can easily be cultivated upon suitable soil. Their vitality, or resisting power, however, seems to be in inverse ratio to their prolificacy. They are affected by light and atmospheric changes. The action of naphtha is very decided in interrupting their growth and ultimately destroying them.

V. Stagnant water contains many forms of microscopic fungi. Some of these belong to the class of "spirilla," and present many varieties of shape. They are of importance to bacteriological science because specific pathogenic action is attributed to some of them. The best known and most malignant, if left to itself, is the typhoid bacillus. Not being able to obtain a pure culture of this germ, I contented myself with the statement of some German and American observers (among them Hare, of Philadelphia), in regard to the action of naphtha upon the bacillus ty-

phosus. According to these investigators naphtha is positively antagonistic to the development of this germ, and kills it as readily as does a 100 per cent solution of bichloride of mercury. As far as other germs contained in stagnant water are concerned, naphtha stops their growth promptly and destroys them, as can readily be seen under the microscope.

From what has been said there can be no doubt that naphtha possesses marked germicidal power. What forms of microscopic fungi are particularly affected by it and how naphtha compares in this respect with other germicidal agents, only careful and systematic experiences can show. But in order to furnish a basis upon which to establish the hygienic value of naphtha in connection with the garbage question, it is not necessary to experiment with pure cultures. I have, therefore, confined myself to the microscopic examination of mixed specimens obtained from garbage, and can, after numerous experiments with mixed specimens and observations of the action of naphtha upon them, answer the question as to the germicidal properties of naphtha in the affirmative.

Experiments all conducted with cold naphtha.

Respectfully submitted.

Otto Juettner, M. D.,
Bacteriologist to Department of Health.

Is Typhoid Fever a Rural Disease?

Daniel B. D. Beaver, M. D., of Reading, Pa.

In the discussion of this question before a lay audience it may be well to take a retrospective glance at the development of the knowledge regarding it, which is now in the possession of the medical profession.

The first observations which pointed the way to the belief that this disease was due to a material, tangible and visible cause, were made about thirty years ago. There were reported then local eruptions of the disease in small villages in this country and Europe in which the cause was traced to a single well, by observing that all the persons affected by it obtained therefrom their supply of water. Such observations accumulated rapidly, and were made with so much care to exclude error that in a short time the profession was in possession of an array of incontrovertible evidence that impure water is one of the most common sources of the disease. Some years later outbreaks of the disease in cities were traced in like manner to certain dairies by observing that its ravages were confined closely to the routes of particular milkmen, following them in their sinuous courses, striking a family here and there, and then skipping a few houses or as many blocks to turn up with them again.

By that time there was firmly established the belief that typhoid fever was due to some material cause which was transportable in water and milk, but we had no definite idea of the character of this morbid material until some years thereafter, when the bacteriologist demonstrated it to be a living microbe, a low form of vegetable life which, however, has as distinct, separate and independent existence as a grape-vine, and, like it, can be seen, touched and cultivated.

Now, then, believing that the entrance of this living microbe into the human body is the cause of typhoid fever, we are ready to discuss the question as to whether or not this is a rural disease. By a rural disease is meant a disease of which the cause is primarily found more frequently in the rural districts than in cities, and which could not arise in cities if its cause did not pre-exist in the country.

Observations extending over a period of fifteen years have convinced me that typhoid fever is a rural disease.

In an investigation of the comparative frequency of this disease in the city of Reading and the surrounding country during the year 1889, I found the proportion of cases to residents in the city 1 to 246, and in the country 1 to 129, the proportion in the country being nearly double that of the city.

This difference is too great to be due to accidental circumstances. There are permanent conditions which give rise to it, and they are visible to any one who wishes to look for them, and undoubtedly exist in other localities as well as here.

In all the severe endemics of this disease in cities and towns of late years which were investigated, it was shown most conclusively that the poison was imbibed by the victims with their drinking water, and that the water became polluted directly by the discharges from the bowels of persons ill with the disease. In the larger towns and cities this source of infection is altogether absent because the supply of water comes from some outlying district through pipes, thus making it impossible for careless or ignorant residents to contaminate it with the stools of sick persons. The contamination must occur before the water reaches the supply pipes, and in the rural district drained by the streams which furnish it.

Much has been said of late years about bad plumbing as a cause of this disease in cities, and it is questionable whether the plumbers have not been blamed innocently for many cases which, by more thorough investigation, might have been shown to be owing to other causes. In houses connected with a common city sewer there may be some danger of infection from the sewer, but it must be very small unless the grossest negligence is practiced by the occupants, because the pipes connecting buildings with sewers are always moist and therefore in good condition to hold microbes or moulds that may be growing on their surface and prevent them being carried upward with escaping gas

or air. It is well known, of course, that currents of air of sufficient dryness to desiccate the surface over which they pass will carry along loose bacteria and other small particles of matter, but it is not probable that the moist air of a sewer pipe moves with the velocity necessary to detach moist and adherent growths from its surface. At all events a properly flushed, filled and cleaned bowl in a water closet should be, and probably is, an impassible barrier to the low forms of life in the pipes below it.

In Reading there are no common sewers. The houses with baths and indoor closets discharge their sewage into wells in the yards, which are required to be not less than twenty feet deep.

The surface soil, to a depth of ten to thirty feet, is sandy and porous, carrying off water and solid material in solution so quickly that most cesspools fill very slowly and require to be emptied only once in many years. This being so, there must be many wells in this city which have received and now contain the excretions of persons sick with typhoid fever, and yet the houses connected with these wells by pipes presented less than one-half as much typhoid disease in 1889 as the houses with no indoor closets and baths, and no connection with the cesspools.

Furthermore, a large percentage of the cases which occurred in houses with baths and closets were in recently built houses, of which the diseased persons were the first occupants. The cesspools in these cases could then not be regarded as the source of infection, unless they were shown to be breeding places for such typhoid microbes as might enter them with the outside atmosphere.

It is not improbable that a microbe which attacks the human body only through that part of the intestine in which the contents already possess the characteristics of evacuated fecal matter, might find masses of human excrement suitable to development and multiplication; but then the production of these microbes should be vastly greater in the country than in cities.

Then again, this microbe, unlike the tubercle bacillus, is rarely found in the air and dust in cities, because it is not, like it, cast upon the streets, but thrown underground in wells or sewers, where it is out of reach of currents of dry air.

If, then, the air and water can be excluded from the sources of infection in cities, there remains but one other, and that is the food supply. In regard to this, it may be said in favor of the country, that city and country are dependent upon each other for sustenance, but a moment's reflection will show that they exchange entirely different kinds of food, otherwise there would be no necessity for the exchange.

The articles which are taken from the city to the country are produced, almost without exception, by chemical action, or in their manufacture exposed to degrees of heat that would be fatal to any form of life. On the contrary, the articles which the city receives from the coun-

try are produced without the aid of destructive heat or chemical action, such as milk, butter, cheese and the vegetables which are eaten uncooked. Most of these articles are contaminated by water in which they, or the utensils in which they are made, are washed; but vegetables may also bear the poison directly from the soil in which they have been grown, especially if the soil has been fertilized by the use of the contents of cesspools. Indeed, Dr. C. M. Cresson, of Philadelphia, whose ability as a microscopist is unquestioned, informs me that he found the typhoid microbe on celery stalks, in the fissures between the leaves. One well-authenticated observation like this should condemn the use of night soil as a fertilizer, and dissuade every intelligent farmer from using it.

Aside from the few instances of direct contamination of vegetables by the soil, water is then the medium through which the typhoid virus is disseminated, whether it enters the body of its victims with food or drink; and the pollution of the water occurs at its fountain in the spring or well on the farm.

Springs are generally located and wells dug in low ground, and the farm buildings arranged conveniently around them. Usually the house and barn are nearest the water, and the other outbuildings and privy some distance away, and almost invariably the latter are on higher ground. The drainage then is from the privy toward the water; and in sandy or shale subsoil, which is very porous, there can be only one result—pollution of the water by the contents of the privy. Now, if a case of typhoid appears on such a farm, what will follow? The fecal discharges of the invalid, which are loaded with fever microbes, more than all the other excretions from his body, are thrown into the privy. The sick one may get well, and the rest of the family escape the disease for the present, ignorant of the fate that awaits them. The poison is already in the cup and need only be taken.

With the next season, or possibly after the next heavy rainfall, one member after another takes the bed, until the whole family have been down with the disease.

This has occurred repeatedly in my experience. I recall now one instance in which every one in a family of nine persons was laid up with the disease.

After communication between a typhoid-infected cesspool and the water-fountain on a farm has been established, there is no telling how long it may be a source of illness. It is possible, as has been already said, that the cesspool may be a breeding-ground for the microbes, and that they may reproduce themselves there for years, or the occupants of the house may change often, so that at short intervals broods of humanized, and possibly more highly vitalized microbes are repeatedly added to the old stock. There are, undoubtedly, many farms in this

State which send to market crops of typhoid microbes as regularly as butter and cheese.

Several such fever farms were reported to me from this country in 1889, but the one most distinguished in this respect came under my notice some years ago in an adjoining county. While riding with a physician on his way to see a patient, he pointed to a farmhouse which he said had a strange history. He had practiced medicine in the adjacent village thirty years. The farm was occupied by tenants who were changed every few years, and during these thirty years every family that lived on the place passed through this disease. Could the products of this farm have been followed to their destination through this long time, might not terrible tales of woe been unfolded?

How many dwellers in cities, who consumed the products of this farm kitchen, were doomed thereby to an undeserved sickbed and, perhaps, a premature grave?

If the time allotted to this paper would permit it, more facts might be presented in support of the theory that typhoid fever is a rural disease, under the definition I have given; but as the object is to awaken interest in the subject rather than to prove anything conclusively, enough has probably been said. To those who look with favor upon this theory it will be apparent that it behooves us all, whether we are residents of city or country, to bring to the attention of those in authority in the State, and the people in the rural districts, the danger which threatens them and us through the ignorance of the cause and manner of the spread of this formidable disease, on the part of the class who are in charge of the very fountains of our common food and water-supply.

Trichinosis; with Report of Cases.

A Plea for the Obligatory Examination of Meats Under the Supervision of a National Department of Public Health.

By Murray Galt Motter, A. M., B. S., M. D., Lancaster, Pa.

When, last Tuesday evening, the Hon. S. T. Davis, M. D., an active and efficient member of the State Board of Health, requested me to read a paper before this convention, it occurred to us both, that I could, perhaps, choose no subject of more general and immediate interest than that of trichinosis. Before speaking of an instructive series of cases that engaged the attention of the medical faculty in Lancaster, during the past winter, allow me to dwell, for a moment, upon the history of this disease.

In 1833 Hilton recognized in muscular tissue small, calcified capsules · little envelopes, formed in the sarcolemma or elastic sheath surrounding the muscle fibres—filled with a deposit of lime salt, but he mistook them for cysticerci, to which we will refer later. In 1834 Paget, while a

student, discovered that these capsules contained a round worm, which was in the following year, named by Owen *Trichina Spiralis*, from the peculiar and characteristic spiral form which the worm was found to assume. Up to this time the source of the parasite was unknown, but in 1846 the late Joseph Leidy, just two years after his graduation from the University of Pennsylvania, and when he was but twenty-three years old, made the discovery which had escaped these eminent investigators on the other side of the ocean. One day, as he was about making a ham sandwich, he noticed a number of small white dots, no bigger than a pin-point, scattered over the meat; these, under the microscope, he discovered to be identical with the trichinæ spirales described by Owen, and which he had frequently seen in his dissections of human muscles. To this discovery, as much as to anything else, was due the expulsion of the "American hog" from Germany. In 1850 Herbst succeeded in raising the larvæ by feeding trichinous meat to dogs. The following year Luschka recognized the finer end of the worm as the head; and, in 1859, the adult worm was studied by Virchow. In 1860 "Leuckart, of Giesen, having the German savants' advantage of a *corpus vile experimentum fieri*, fed trichinous pork to condemned criminals and, by a post-mortem examination, confirmed Leidy's theory." Hitherto the parasite had been looked upon simply as a curiosity; with one exception, all had unanimously considered them innocuous, and some had positively affirmed that they produced no disturbance whatever. Wood, however, had, in 1835, propounded the question whether a case of severe rheumatism, observed by him, might not possibly be connected with the trichinæ found. This terrible misapprehension was rectified by Zeuker, in his study of a single case, admitted to the Dresden Hospital, on January 11, 1860, as a case of typhus.

"The theory of trichinosis had, then, in its essential points reached the following form: Man becomes affected with trichinæ by the use of trichinous pork. The *muscle trichinæ*, in the stomach, become freed from their capsules and developed, in the intestines, to mature, sexual worms, *intestinal trichinæ*, which attain their full growth at the end of about seven days and give birth to living young. These young trichinæ migrate directly from the intestine in which they are situated into the muscles of the same individual; since during their migration they are found in the mesenteric glands, abdominal cavity and pericardium. They penetrate into the interior of the muscular fibres and cause the destruction of the contractile substance; here they grow to perfect *muscle* trichinæ. These migratory processes bring about, in a man, a severe febrile disease—trichnosis—which may result in death, both in man or beast. Cases of encapsulated trichinosis, are to be considered as healed cases of trichinosis." The various steps by which this theory was built up, rests principally upon the investigations of Leuckart, Virchow and Zeuker, who worked independently and in part almost simultaneously upon specimens from Zeuker's case.

Probably the oldest epidemic known, with more or less certainty, to be authentic, is one which occurred in Wurtemburg, in 1675, in the family of a miserable farmer. The father and his son died; all the remaining inmates of the house who had partaken of the meat were taken ill. A number of epidemics were noted and studied after Hilton's discovery in 1833. Especially interesting was that in Wegleben, near Quedlinburg, in 1849–50, which was subsequently recognized. It was designated at the time as "English Sweat," or "black death." How many trichinæ epidemics were buried under this pseudonym, only a careful study of reports can ever divulge. These reports have come from all over the world; according to an oral report, by Cobbold, trichinosis was diagnosed for the first time in England, in Northumberland, in 1871. So much then for the history of the disease.

The trichina spiralis, one of the class of round worms or nematoda, is met with, as we have seen, under two forms, the intestinal trichina and the muscle trichina. The adult, sexually mature trichina (the intestinal form) is an extremely fine, round, thread-like, slightly coiled worm, with a still finer head, which gradually decreases in thickness towards its point; its hinder extremity is rounded off rather abruptly, the chintinous integument is slightly annulated. The males attain the length of a millimetre and a half, and are furnished at the caudal extremity with two pointless, lobular appendages, and a genital opening which, together with the end of the rectum, forms an outlet directed forwards. The internal sexual organs are already complete even in the muscle-trichinæ. The females are from three to four millimetres long; their genital opening is situated about at the junction of the first and second quarters of the whole length of the body. Only a part of the internal sexual organs of the female are present in the muscle-trichinæ, and a part are formed during its sojourn in the intestine. The embryos of the eggs develop in the uterus and are born from one end of it free—and living. The birth of the embryos begins on the seventh day after the introduction of the muscle-trichinæ into the stomach, and it may continue, as it appears, for weeks. Yet, a repeated maturation of eggs, as it were, in crops seems now and then to occur. The embryos do not long remain in the intestine, but soon migrate to settle in the voluntary muscles. In about fourteen days the muscle-trichinæ attain the greatest size ever reached by the parasite while in that state; they attain a length of from 0.7 to 1.0 millimetres, and they usually lie singly or more rarely in two, three or even four in one capsule. Their digestive canal and the sexual apparatus, although the latter is not yet fully developed, are distinctly visible, as intestinal-trichinæ the intruders have a very limited duration of life. They very rarely live longer than from five to eight weeks. Observations of a longer existence may be explained on the supposition of a repeated importation. The muscle-trichinæ have a much greater tenacity of life; their vitality is almost unlimited and fre-

quently ends only after the death of the person affected. In some cases they have been found living even after the lapse of decades. After a short time a deposition of lime salts, especially of carbonate of lime, usually takes place in the capsules; this causes it to become cloudy and opaque, and after a time, the trichina is entirely hidden. The capsules then become evident to the naked eye as small white dots or streaks, while previous to the calcification, they were visible only to experienced observers. This condition in pork is to be distinguished from that known as "measly pork," which is due to the presence of the cysticerci of the *tænia solium*, the ordinary, long, intestinal tape-worm, which compared with the *trichina spiralis*, is as the leviathan to the water shark. If then the capsulated muscle-trichinæ be introduced into the stomach of a proper animal, they will be freed from their capsules, become sexually mature within a few (usually two and a half) days, copulate and the females will bring forth living young after five days, *i. e.*, seven days after their importation. In addition to men and swine, the trichina has been found in the cat, rat, mouse, marmot, pole-cat, fox, marten, badger, hedgehog, raccoon and bear. By feeding them experimentally the trichinæ have been successfully bred in rabbits, guinea-pigs, sheep, calves and dogs. In the three latter animals, however, the experiments seem to have been only exceptionally successful. As a rule, the formation of the intestinal trichinæ is the full extent of the infection in dogs.

Trichinosis generally begins with symptoms of more or less gastro-intestinal disorder, such as a sense of pressure and fullness in the epigastrium, impaired appetite, discomfort after eating, nausea or vomiting, eructations, colicky pains and diarrhœa, with a feeling of much languor and depression; in some cases the onset is characterized by violent sickness and purging, simulating cholera or irritant poisoning. Occasionally the disease sets in quite insidiously, with merely a feeling of lassitude and depression, wandering pains and stiffness in the limbs. The subsequent characteristic symptoms are those dependent upon the conditions of the muscles. Those of the limbs which are affected become painful, tender, swollen, hard and rigid: there is much stiffness, movement being greatly impaired, and the joints are fixed in a state of more or less flexion, any attempt to extend them causing severe pain. From the complication of various muscles there may result attacks of severe dyspnœa, aphonia, trismus, dysphagia, impaired movements of the tongue and other symptoms. A peculiar œdema is also observed, affecting the face and eyelids, and extending in the limbs from the upper part towards the hands and feet. Symptomatic pyrexia accompanies this condition, often severe: the temperature sometimes rising to 106° and the pulse to 120 to 140; abundant clammy perspiration may be observed, and occasionally sudamina appear. In cases tending towards a fatal issue, low typhoid symptoms set in, frequently accompanied with

signs of bronchitis, pneumonia and other inflammatory affections. Should recovery ensue, the muscular symptoms gradually subside, as well as the pyrexia; but convalescence is usually protracted, marked debility, anæmia and œdema remaining for some time. To illustrate this I report a series of cases which occurred in the practice of a brother practitioner, and which I saw with him about the middle of December. On Thanksgiving day, November 26, 1891, Martin K. R. purchased from his butcher a dressed hog, which he and his family immediately proceeded to cut up into sausage-meat, hams, spare-ribs, etc. For several weeks they ate no other meat, but about the first of December Martin and his wife and their eight children became ill. Edna, æt. eight, Stella, æt. twelve, and John, æt. sixteen, went to bed and soon developed alarming symptoms. The correct diagnosis was soon made, and unfortunately was absolutely confirmed by the autopsy, which I made upon the remains of Edna, who died December 20, and whose muscles were found to be simply swarming with living trichinæ. Stella lingered and suffered until February 5, 1892, when she died, as did her little sister, from evident respiratory failure, due to the encroachments of the parasites upon the muscles of respiration. John is on the slow road to recovery. These cases are noteworthy, in that children as a rule escape. These three children presented typical casts of profound infection; the other members of the family and two neighbors, who had partaken of their sausage, were not very seriously affected, though they gave positive signs of a certain degree of infection.

Of all the ills that flesh is heir to, the treatment of few is as hopeless as in trichinosis. The ultimate issue seems to depend almost wholly upon the number of trichinæ ingested; this in turn depends upon the number of trichinæ in the meat used and the amount of the latter and upon the mode of its preparation. The disease is so seldom recognized as such in the early stage, when alone measures looking to the complete evacuation of the digestive tract and the removal of the cause would be of avail. Castor oil or other aperients, glycerine, which, by its peculiar hygroscopic properties, acts directly upon the integument of the worm, and of the newer remedy, thymol, salicylic acid, oil of chabrite and kamala are to be tried. Merrill strongly recommends arsenic. McCalla reports four cases cured by the use of salicylic acid and antipyrin—the latter drug relieving almost immediately the horrible pains. The general treatment must be of a supporting character—quinine and stimulants being also administered. Other symptoms and complications must be treated as they arise. Realizing, then, the difficulties which beset the therapeutic treatment of these cases, which are in such large proportion fatal, it behooves us to turn our attention to the prophylaxis of the disease. In this country our pork is trichinous to the extent of two and a half per cent., while in Germany it is but one-tenth of one per cent. We might, of course, take "Paddy's" advice and when we eat

pork, eat beef instead! so escaping all possibility of infection, for it is from swine pre-eminently and directly that man is infected with trichinæ. We may remark parenthetically, that there would indeed be danger of "jumping out of the frying-pan into the fire" by substituting tuberculous beef for trichinous pork; then indeed would the "last state of that man be worse than the first!" Next, all can insist, if all must eat pork, upon its having been well pickled and smoked, and, above all, most thoroughly cooked. The pickling and smoking, contrary to some of the older authorities, do not seem sufficient to destroy the parasite, though recent experiments promise some progress in this direction. Of the different methods of cooking, boiling is the most effective, frying and roasting the least so; and the boiling temperature should be maintained, for a length of time sufficient to insure the thorough heating of the interior of the piece of meat in course of preparation. The third, last and most important of all prophylactic measures is:

Government Inspection of Meats.

It is this part of the paper which especially concerns us as sanitarians and to this question I ask your especial attention. At the opening exercises of the Institute of Hygiene of the University of Pennsylvania, held on the 22d of last month, the "day of the immortal cherry tree," Dr. Benjamin Lee, the able Secretary of our State Board of Health, delivered a noteworthy address. He began with a serio comic satire on the advantages of life in this "land of the free and home of the brave," as compared with that in the bureaucratic countries of the old world, whose inhabitants groan under the iron heel of despotism. He says: "The tyrannical rulers of those down-trodden peoples actually presume to interfere with their meats and drinks, forbidding them to quench their thirst with water enriched by the sewage of cities, hallowed by the infusion of the remains of their dear ancestors, or delicately tinted with the drainage of coal mines; or to refresh themselves with beer rendered aromatic and enlivening by cocculus indicus and strychnine; or wine manufactured from the juicy apple and the generous turnip, or tea composed of rotten leaves and catechu and colored with verdigris; or coffee innocent of Java and Mocha, or chocolate in which the offensive cocoa butter has been replaced with tallow. They are not permitted to eat the flesh of tuberculous cattle and trichinous swine, while we are freely allowed to feast on those which have been *condemned for their markets!*"

This is an actual fact, our great American Government affords almost absolute indemnity to the foreign consumers of our large pork shipments, while there is no law to prevent the meat, which has been condemned for the export trade, from being turned into our home markets. It is true that this State provides that animals affected by contagious diseases may be quarantined and if necessary, killed, but for our present purpose this law is ineffective and somewhat in the manner of "locking

the stable after the horse is stolen." To illustrate the thoroughness with which this matter is dealt in Germany, the order of the Minister of the Interior, issued July 21, 1889, regarding the method in which the obligatory examination of pork shall be carried on, for the prevention of trichinosis, contains fourteen sections, concerning the regulation of record-books, character of microscopes to be used, appointment and pay of examiners, etc. The examination of each hog must include six pieces of flesh as follows: (1) from the columns of the diaphragm; (2) from the muscles of the diaphragm; (3) from the lumbar or laryngeal muscles; (4) from the abdominal muscles; (5) from the intercostal muscles; (6) from the tongue muscles. From each of these six pieces of flesh, at least six preparations, must be made, in the form of longitudinal sections, one centimetre long by one-half centimetre broad, and thin enough for investigation. In the examination of ham and sausages, these pieces of flesh are to be taken from different parts, and from each at least four preparations made. The tests of pork and meat should be made in the region of bones and tendons. Each trichina examiner is limited to the examination of ten hogs in one day. The ordinance took effect September 1, 1889. As compared with this, mark the wholly inadequate provisions of the act of our own Congress, approved March 3, 1891. "The inspector will take from each hog *two* samples of muscles, one from the 'pillar of the diaphragm' and the other—from another part of the body!"

The passage of this act, and the subsequent readmission of American pork into Germany was hailed with great delight—more particularly on the part of American pork-packers and shippers.

The French revenue expert sent to inquire into the system of American inspection of pork, publicly states that the system of Secretary Rusk is perfect, and that "it is neither possible nor advantageous for anybody to pack or export a single American hog that has not undergone microscopic examination."

It requires but little consideration of the subject to see wherein our regulations fall far short of our needs. In the first place, the act above referred to, has to do principally with meats intended "for export to foreign countries," and no vessel with such a cargo can be cleared until she shows the certificate of the government inspectors. So far, so good, and if it pleases our friends on the other side of the water, so much the better. There is, then, a provision for the inspector, "prior to their slaughter, of all cattle, sheep and hogs, which are the subjects of interstate commerce, and in addition to the aforesaid inspection, there may be made in all cases when the Secretary of Agriculture may deem it necessary or expedient, under the rules or regulations to be by him prescribed, a post-mortem examination of the carcasses of all cattle, etc., subjects of interstate commerce." That is, I suppose, Secretary Rusk, upon hearing that half a dozen people had died from trichinosis, in Erie or Lancaster, might order an inspection of meat of that city. It is even

unlawful for John Smith, of Pennsylvania, to sell his trichinous swine to Thomas Jones, of New York; but John Smith, of Erie, may ship all his trichinous meat to William Roberts, of Lancaster, and be paid for the same in the coin of the realm, yea, even in seventy-cent dollars. A number of the largest and wealthiest of the pork packing establishments are now equipped with microscopical laboratories, and microscopists, for the whole of which outfit "Uncle Sam" through "Uncle Jerry," generously foots the bills. Do not misunderstand me as decrying the efforts made on the part of our National Government in any of the lines of scientific investigation. The bare mention of our National Board of Health, short-lived as it was; the names of Sternberg and Shakespeare, whose investigations into yellow fever and cholera reflected credit alike upon themselves, their profession and the government, whose especial commissions they held for the purpose; the record of the Army Medical Library and Museum, and of the Marine Hospital service, and even of the recently organized Department of Agriculture, are all subjects for our congratulation. This is an age of progress and of investigation and education, in evidence of which we are gathered here to take counsel together concerning the sanitary problems which confront us. How, then, may we best take advantage of this *Zeitgeist*, that intangible and at times unrecognized force, which is, according to Bryce, the salvation of "The American Commonwealth." It is needless to speak here of the significance and importance of modern preventive medicine. A single glance at the report of any board of health shows the terrible difference in the mortality lists of those preventable diseases which are still, owing to the ignorance or indifference of the general public, beyond the control of the sanitary scientist, and those which, like small-pox, he has practically eradicated. How shall the general public be lead to know its necessities in this line and to demand their abatement? Last summer, at the forty-second annual meeting of the American Medical Association, a resolution was passed authorizing a committee to memorialize Congress for the establishment of a National Department of Public Health, with a cabinet officer to be known as the Secretary of Public Health. On the 10th of December last, such a bill was introduced by Senator Sherman, and has already engaged the favorable consideration of a number of his colleagues. Referring to the functions of such a cabinet officer, the committee of the American Medical Association said: "He will represent the medical consciousness of the nation, and be one to whom we all can look for the exploitation of measures that will direct continuous scientific and collective investigation, in regard to endemic as well as epidemic diseases that afflict the people. He will be able to co-operate, co-ordinate, unify and utilize, in the discharge of his duty, all the work of state boards of health, now so well organized in various States of the nation; and these in turn will find themselves strongly reinforced by the example and authority of a great central officer who will

be equal in function and opportunity with the other members of the President's cabinet." He would also have to consider the questions of higher medical education, of the regulation of immigration and many other questions pregnant with the vital interests of our great nation. Can you conceive of a more important measure?

A. W. Suiter, in his address at the eighty-sixth annual meeting of the Medical Society of the State of New York, puts the case even more strongly: "The Fifty-first Congress of the United States has just passed into history. Among the many famous distinctions which it won, was its title to the appellation 'The Billion Dollar Congress.' Think of it, one thousand million dollars appropriated by a single Congress for the material interests of this nation! And in the multitudinous bills which provide for the disbursement of this enormous sum of money not one clause or paragraph appears which can, in any manner, be construed to apply directly to the elucidation of any one of the important and vital problems connected with the prevention of the infectious diseases with which the tax-paying people are constantly menaced or afflicted." Dr. Suiter proposes that there be a Health Department of the Interior, organized on the lines of the old National Board of Health, and the Marine Hospital Service especially, clothed with powers relating to external quarantine. These to act separately or conjointly as circumstances may dictate; both to be officered as may be found necessary, and the officers salaried and even pensioned upon retirement, that they may devote their whole time and energy to the duties of their positions. In connection with the former department, he should have numerous experiment stations established, which should be entirely under government patronage and control, and fully equipped with laboratories—chemical, physical and bacteriological. Some such experiment stations as he describes—though of course not under government control—are already inaugurated: those most recently and thoroughly equipped, perhaps, being in connection with the Departments of Hygiene, in the University of Pennsylvania, at Philadelphia; and the University of Michigan, at Ann Arbor, where every facility is afforded to those interested in this line of work, and especially to public health officers, at the minimum expense. But, the crying need seems to be for some centralized management in order that the best results may be obtained. This we hope to attain in the development of the Department of Public Health, which will have, among other functions, the supervision of the obligatory examination of food stuffs and meats. Referring now, more particularly, to the subject of trichinosis, we have estimated that in a city of the size of Erie the cost of inspection of pork products, which are liable to be infected to the extent of two and a half per cent., need not add a quarter of a cent per pound to the cost to the consumer. This is indeed insignificant when we take into consideration that we can, in this way, and only in this way, secure entire immunity from a horrible disease.

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Methods of Collection, and the Disposal of Waste and Garbage by Cremation.

COL. W. F. MORSE, NEW YORK CITY.

The problem of waste collection and disposal is an ever-present one. The production of waste goes on contemporaneously with life. There

is no living creature but discards some form of effete or worn out matter, and as the scale ascends from the lowest forms of animal life to man, so the amount of worthless and exhausted material increases with each gradation. And as the result of life is the production of waste, so the accumulation and continued presence of waste mean discomfort, annoyance, nuisance, disease and premature death, for it is certain that substances necessary to the support of the living become, by assimilation, by use, by association even, changed into matters which are deadly poisons to all the higher forms of life.

To the health department of cities and towns is assigned the oversight, often the direct execution of the laws which govern and control the collection and final disposition of this mass of waste. With the health officials lies the responsibility, and from them comes the suggestions, advice and orders which compel the adoption of sanitary methods, the abatement of nuisance, and the regulation of disease dangerous to public health. And so it follows that any phase of this great subject of the public welfare which relates to promoting the com fort even of the people, is something which may not be overlooked by the zealous health official.

It has fallen to my lot to be thrown into contact with a great number of health officers and civil authorities who are interested in the subject of garbage and waste collection and disposition, and the questions asked, the information desired, and the objects sought for, have led me to the conclusion that if the experience of the many could be brought to a common point for comparison the results might afford some hint for future guidance.

The beginning of this question is in the household. How are the waste of the table, the sweepings, the yard refuse, the ashes from fires, put aside to be taken away? Usually altogether in a pile, a box, barrel or an iron can, a mixture of matter which no human power can thereafter separate, or wisely and safely dispose of. The ashes and a large part of that refuse should be put by itself, the worthless and putrescible matter by itself. The one is good for some sorts of work, the other valueless and dangerous, and this separation can only be made at the house, and that with a small amount of trouble.

The collection of waste is done by four different agencies. These are:

First—The Individual System. Every man taking care of his own waste in his own way, with no responsibility for results, with little regard for cleanliness of method, with the only object of getting it away out of sight in the shortest time. A householder hires a cart man and sends away a load a week in winter, mostly ashes; in spring, of all sorts of refuse and cast-off things; in summer, of vegetables and animal leavings from the food supply. The cost is from ten to fifty cents per week, and there is no attention paid by anybody as to what is done

with the waste. So, annually, the privy vault is cleaned at any price that can be agreed upon, and the duty of that householder is discharged. The results are: First, the payment of at least double the amount it would cost if done under regulation by the town authorities, and second, the promiscuous dumping of all manner of accumulations by an irresponsible cart man at any place where he will not be detected. There are cities of 100,000 people who have no way but this of getting rid of waste.

Second—The License System. Men are licensed to do scavenger work. The city charges an annual small fee, issues a permit and a badge or sign. These men sometimes number two or three hundred, and all make a revenue. Usually a sort of route is established and a certain number of patrons secured, which are fairly well looked after. As a rule the city designates certain places where the garbage shall be put, and has an oversight, through the sanitary police, over the scavengers. While the amounts charged are low, still the sum at the end of the year paid by each householder is more than double what would be paid under the operation of a better system. The advantage is that the scavengers, being known, can be more readily detected in any infringement of the sanitary laws and punished.

Under this license method the removal of night soil is almost universally carried on, no collector being allowed to do work unless he has provided the equipment of tightly sealed barrels, kept clean and inoffensive, the work to be done with prescribed disinfectants and at certain hours, and the excreta conveyed outside the city limits.

The trouble comes with the deposit of this excrement on adjoining lands. Up to a certain point in the winter season the farmers will allow its placing on their land, but presently this is objectionable, the neighbors protest, there is talk of injunction, complaints increase, the collector goes farther away, the thing is repeated until there comes a time when the long haul to place of deposit increases the tax upon the householder, and it becomes a most serious burden. If the money annually paid by the inhabitants for this work was applied to a proper collection and disposal service under municipal regulation, it would only pay the cost but go far toward paying for all the garbage collection as well.

In an eastern city, where this work is done by the city teams and men, the receipts at a very moderate price for each vault cleaned not only paid all expenses, but made a profit of 37 per cent. upon the cost, and paid 34 per cent. of the expense of garbage collection.

In a southern city this work, done by the city, makes a profit of $400 per month, and in another, where no vaults are permitted, the annual expense to each house is $3.00 per year only.

Third—The Contract System of Collection. The city advertises for

bids, and annually lets out the whole work of garbage service. This is the most convenient way for the authorities to have the work done; but it is also a less efficient way than the municipal system. The contractor is often compelled, by competition, to do the work at a small margin of profit, giving poor service, causing endless complaints and a general feeling of annoyance. Often changing his employes, the householders are overlooked, sometimes intentionally, until a petty system of blackmail is established; and there being but a limited responsibility, because of the usually short term of contract, the contractor, takes little pains to do good work, preferring to skim over his district as quickly as possible.

The experience of a great number of places is not favorable to the contract method, and by comparison in the same place where a part of the work is done by the city, the service of the contractor is inferior to that performed by the city's teams and men. But the contract method is often the only way in which the work can be done, and when in use there should be the most vigilant inspection service maintained.

Fourth—The Municipal System.—In this case the town or city does all the scavenger service with its own teams and men. This makes it necessary to maintain an extensive equipment and to provide for the stables, etc.; but if this be placed under control of the bureau of streets, these men and teams can often be used for other work at special seasons, dividing the expense. The responsibility for cleanly work is more definite, the service more thorough; complaints are promptly attended to; the employes are more careful, and with the proper management, can be made to take pride in their work, and give efficient service.

A trial in several of the large cities of the two methods—contract and city service—has resulted in the recommendation of the municipal system, as the advantages have invariably been shown to be greater.

In a great number of the smaller cities this question of garbage collection and disposal is now under consideration. Up to this time they have ignored the subject, now find themselves compelled to adopt some organized system of collection and a better method of disposal of waste.

A comparative statement of the cost of garbage collection at many places will give a standard by which any city or town desiring to make an improvement can be guided.

Taking the last census as the basis for population, and adopting the per capita method of computation, the following table, while not exactly accurate in all respects, will still show the approximate cost of collecting garbage, reckoned in figures, for each inhabitant.

The following cities and towns make their garbage collection by contract, the cost named per capita:

		The following use the municipal system:	
Chicago,	24 c.	New York,	21½c.
Philadelphia,	13½c.	Boston,	22½c.
Washington, D. C.,	10½c.	Providence,	15½c.
Detroit,	17½c.	Milwaukee,	17½c.
Hartford,	13½c.	Memphis,	31 c.
Richmond, Va.,	07½c.	Charleston, S. C.,	18½c.
Montreal,	11 c.	Cambridge, Mass.,	25½c.
New Haven,	08½c.	Los Angeles, Cal.,	27½c.
Toledo,	13½c.	Newport, R. I.,	20½c.
Richmond, Ind.,	13½c.	Lynn, Mass.,	12½c.
Portland, Me.,	12½c.	Lawrence, Mass.,	25½c.
Elizabeth, N. J.,	12½c.	Springfield, Mass.,	16½c.
St. Paul,	08½c.	Yonkers, N. Y.,	37½c.
San Antonia,	30½c.	Keokuk, Ia.,	25½c.
Haverhill, Mass.,	09½c.	Norfolk, Va.,	21½c.

Assuming these figures to be approximately correct, the average cost of contract work would be about 14c per capita, and of the municipal service about 22c—a difference of 8c per capita in favor of the contract service.

About 17c per capita may be taken as the cost which will give effective service for any city or town, and be stated as the mean standard for most of the places in this country. This has no reference to the cost of removing night-soil, but applies only to the garbage, ashes and refuse collection, and does not include the cost of equipment, but only the annual expense of removal.

Any method for thorough and satisfactory collection of all garbage, whether done by the contract or by the municipal system, will include some well defined and simple rules which should be rigidly enforced.

I. An iron garbage can, with tight cover, into which the household puts each day's table offal, tin-cans, house sweepings, cast-off articles, worthless matter, everything except ashes and non-combustible material. This can is set in a particular place, always ready for the collector. The ashes are separately placed in another receptacle.

II. The collector's cart is preferably of iron, with tight cover; or, if of wood, made water-tight, with a wooden or canvas cover, holding one or two cubic yards, drawn by one horse, arranged to tip up and discharge its load with no loss of time. The garbage collection service is daily in summer, tri-weekly in winter; the ashes collection weekly in summer and tri-weekly in winter, by a separate set of teams and men, and used for city work in filling low grounds or as the foundation for streets. The days of collection, and if possible, the probable hour, are stated on a printed notice posted up in each household.

III. When the collector finds in the cans ashes mixed with garbage, he may refuse to receive it, and, if persisted in, the sanitary officer notifies the party of the penalty, and, if needed, enforces it. Unsually one or two examples are enough to convince any community of the wisdom of obeying the regulations.

IV. The city being districted, and a sanitary inspector in charge of each, if there are bodies of smaller animals found they are included in the daily garbage collection—the larger animals, if not taken away by those engaged in rendering works, are also removed by the city at the expense of the owner. The carts are cleaned after each load, and kept clean. A daily report from each driver is exacted and a weekly report of the whole made to the health officer. The route of the carts to place of disposal is by the least frequented streets.

V. The work of emptying vaults is done by licensed collectors. They must provide sealed oaken or iron barrels or iron tanks, if possible kept in a covered wagon, the whole equipment to be satisfactory to the health officer, and must be kept clean or the license revoked. The charge for each vault should be fixed and not allowed to be exceeded. As a rule this work is well paid for. The nominal price fixed is almost invariably increased, and by the use of various arts and tricks the collector exacts a sum far greater than the real value of the work done, so that the tax upon the householder becomes a somewhat serious matter.

VI. Contrary to the usual custom, this work is best done in the daytime. The odors are more easily dissipated by the heated air of the day than by the heavy, damp night-air; the work is done with light, and therefore better done; the disinfecting more thoroughly accomplished, and with the proper equipment of barrels or tanks and pumps there is no reason for any nuisance or offense. Of course there are exposed places where it would be unwise, but usually this daylight service will be found best. This is the practice in the Southern States almost universally.

The whole service of garbage collection should be under the immediate supervision and control of the health board. As the control of diseases which may become epidemic belongs to them, as the inspection of water, food and milk supply is done by them, and as this board is held responsible for the sanitary consequences of the good or bad administration of the garbage and dead animals and night-soil collection and final disposal of any place, so they should be granted such power to regulate and administer this department as will render it efficient and satisfactory to the public. Police power should be given the inspectors; the ordinances suggested by the board should have prompt attention; the men and funds for their use should be ample for the work demanded; they should be held to a rigid accountability for a wise, efficient and economical performance of the work, which has been and will always be disagreeable, troublesome, exacting and yet a most necessary part of any communal life.

The Final Disposal of Waste and Garbage by Cremation.

Whatever may be the method used in the collection of waste from a community, the final disposal of this waste is a matter which compels serious attention.

The ways now commonly in use for getting rid of waste may be briefly stated:

The mixture garbage, refuse and ashes are dumped upon low grounds or unused lands, within or near to the city limits. The bodies of smaller animals are included, and too often the contents of privy vaults find the same disposition. The results are only too obvious. Endless complaints, nuisance, litigation, contagion and disease come directly from these piles of rotten matter. When completely covered with earth, and to casual appearance sound and solid ground, there is still underneath the hidden cause of disease, prompt to appear when the piles are disturbed, or when chosen as the sites for dwellings.

Again, the waste is to some extent separated, and the putrescible portions taken away as food for swine. If done well and often, it may be possible to use a part for this purpose, but experience in New England has shown the increase in cases of trichinosis to be, in three years, from three to seventeen per cent. among hogs fed with the garbage of the city of Boston, and an annual mortality caused by hog cholera at other places where city garbage is used as food for swine is so great that measures are about to be taken to prohibit the feeding of any city garbage to swine in Massachusetts. How far the milk sold in cities and towns is made unfit for infants, by reason of the food of the cows being mixed with city garbage, is a matter which can only be conjectured, but it seems probable that a large part of the death rate of infants is due to this cause.

The city waste of all sorts is deposited in the nearest water-course. A large city of this State dumps into a narrow creek, running through its bounds, all the sewage, all the garbage and the bodies of small animals. In the summer season, when the water is low, the barrels and boxes which have held garbage and night-soil, and the bulk of tin cans and miscellaneous refuse are so great as to seriously obstruct the scanty flow of water. A few miles below, another large city takes a part of its water supply from the river into which this creek flows. What must be the quality of the water?

Often the garbage, meaning putrescible matters only, is hauled long distances to farming-land, and used for a so-called fertilizer—a doubtful use of time and men. The value of such material for this purpose is almost nothing. By the time it is converted into plant food, by sorting out the imperishable substances and mixing with muck or earth, the cost of the operation, with the low value of the product, has made the expense greater than its worth. One experiment of this sort usually satisfies the most sanguine advocate of the theory of "returning to the soil anything that has been taken from it." The idea is a beautiful one, but its actual realization, by means of the manipulation of crude and miscellaneous city waste, is a practical failure.

The final disposal of the contents of privy vaults, as usually done, is something which demands still more extended and severe examination;

a matter which is not to the purpose now to discuss, but which may be characterized as filthy, unsanitary, threatening and positively dangerous.

The late advances in sanitary science have brought home to the attention of health officials, and through them to the civil authorities and the general public, the fact that some more sanitary way must be provided for the final disposal of waste; and following this comes the natural inquiry, what better way is there, and what does it cost? Putting aside the plausible theories, and the unpracticable and visionary inventions which by the test of actual trial have proved to be failures, there remain two methods, which in the hands of business men have been brought to the test of continuous work for a period long enough to give data for estimating results.

One is the manufacture of garbage (meaning only putrescible matter) into a commercial product; and the other the destruction of all waste that fire will consume, and the utilization of the ashes for a revenue.

The first method has been used in several of the larger cities for four years past. By means of heat the water and gases of garbage are expelled, and the residue treated by chemicals, which extract the grease, the residuum being used as a basis for the manufacture of a fertilizer. This process is adapted to only one class of the city waste—the vegetable and animal garbage. It does not deal with that large percentage which is included under the term of inorganic waste or refuse, and which in bulk is nearly twenty per cent. of the whole amount produced. Nor does it take any account of the night-soil or contents of vaults, nor, except in a very limited way, of animals. Consequently, the process does not cover the whole field of garbage collection, but limits its work to about fifteen or twenty per cent. of the bulk product; and this must be furnished separately from all other matters.

The works or plant required are large and expensive, the royalties upon the patents costly, and the whole investment beyond the means of any except the larger cities, so that private companies are organized to carry on the work, which require long contracts, at prices usually far above what other systems are willing to guarantee. The operation is attended with risk from fires, because of the materials used, the manufactured product is of variable and very uncertain value, and the operation of the whole investment seems to be hazardous and somewhat doubtful. Of the eight plants erected by the company controlling this process, at different points, at a cost varying from $50,000 to $100,000 each, there are now two only in active use. Two have been given up as unsuccessful; two have been compelled to cease by reason of proceedings at law involving their insanitary operation; one is treating garbage at a cost of $1.80 per ton, which can be destroyed by fire at 75 cents per ton; and the other is run under serious disadvantages which somewhat impair its usefulness.

There remains to be considered the destruction of garbage, inorganic waste, the bodies of animals and excreta of all kinds by the agency of fire. Assuming that waste is useless, obnoxious, valueless and dangerous, its destruction becomes a question of sanitary and economical performance.

Can it be done without offense and with a reasonable degree of expense? This question can be emphatically answered, yes.

For more than twelve years it has been done in England, at fifty places. For sixteen years the United States Government has destroyed the waste of military posts in a special furnace, and from three to five years' experience of more than thirty different cities and towns in the United States and Canada has proved this statement correct. In this length of time cremation of waste has undergone the severest tests possible, and the results, as reported by disinterested observers, can safely be accepted as conclusive.

The exact description or style of crematory furnace is a matter which each city must decide for itself. There are four now in active use, which have been examined by experts, have stood the trial of consecutive years of work, and which can be depended upon for satisfactory performance. The Mann Furnace is a modification of the English "Destructor," of which one example only is in use at Montreal. The Rider Garbage Furnace, four years in use at Pittsburg and Allegheny City; a furnace at Wheeling, W. Va., using gas as fuel, and in successful operation for some two or more years, and, lastly, the Engle Garbage Cremator, of which there have been some twenty-eight put into use at various places in the last four years, with four more now in process of construction.

To undertake a detailed description of the construction of these furnaces would occupy more time than can be allowed. Each claims certain advantages, and doubtless these claims are well founded; each has its circle of special advocates and ardent partisans, prompt to point out its distinguishing points. For the present purpose it will be sufficient to examine one only, which, by the construction of the largest number, seems to be more generally accepted as capable of the widest range of service.

The Engle Garbage Cremator

may be briefly described as a rectangular brick structure, forty feet long, ten feet wide and twelve feet high. At one end a stack of iron or a brick chimney seventy-five feet high, over the furnace an iron covering house with sliding doors, and at the sides, a little above the top of the furnace, wide platforms with ample driveways and approaches. From the platforms iron slopes lead down to the feed holes in the top of the furnace. These are five in number, one being large enough to receive the carcass of a horse. The collection carts dump their loads directly upon the slopes, no further handling being needed. The garbage, as

it falls through the feed-holes, is caught by grate bars, extending across the interior half way from top to bottom. The liquid passes through these bars and is retained in a shallow concave pan or hearth below the bars. The capacity of the largest furnace is about twenty cubic yards of garbage and fifteen barrels of liquid at one charge. At each end of the furnace, on a level with the garbage grates, are fire boxes, and at the stack end are flues into the chimney, closed by heavy fire-clay slabs. The interior walls are lined with heavy fire-clay blocks, accurately fitted together, backed on the outside by a solid brick wall, braced and bonded together with heavy stays, rods and angle irons. The furnace being charged, the fires are lighted first at the front and afterward at the rear end, the flames from the fire passing over and through the mass of garbage piled on the grates, driving the smoke and gases into and across the second or front fire, where they are consumed. The flames from the second fire are, by the action of the strong draught, brought back underneath the garbage grates, intensely heating the garbage from the under side. When liquids are to be destroyed, a part of this heat and flame is directed under the hearth or pan, and all the contents quickly evaporated and burned. All the odors, gases, and product of combustion are passed through one or the other of the fires, there being no escape except across these fire boxes. The ashes, as they fall through the grates, are raked out of a lower range of doors on the side, and from time to time, as required, the garbage is stirred up and distributed over the grates by bars thrust through an upper range of stoke doors.

The action of the furnace is continuous, and has been carried on for six months together without cessation. Usually the whole garbage collection, including the bodies of animals of whatever size, is daily destroyed, and at night the night-soil is consumed. When large quantities of night-soil are to be consumed it requires a specially constructed furnace to dispose of the liquids, but when the quantity is small it is burned in the garbage cremator, with no interruption of the operation in destroying garbage.

The body of a horse is consumed in an hour, a dog in six minutes, and a cubic yard of garbage may be destroyed in ten or fifteen minutes, or less, if containing small amounts of liquid.

The cost of operation depends mainly upon the quality and cost of fuel. Under ordinary conditions, with the labor of three men, and a good quality of fuel, seventy-five yards of garbage and miscellaneous refuse (equivalent to thirty tons) can be destroyed at a cost of ten to eighteen cents per yard. This may be stated as equivalent to thirty to fifty cents per ton.

The latest furnaces, built at Savannah, Ga., destroy 3,000 cubic feet of miscellaneous garbage with 128 cubic feet of pine wood. On a week's run 21,000 cubic feet of material is destroyed. This is a pile of refuse matter $\frac{3}{5}$ of a mile long, three feet high and three feet wide, burned to

ashes in seven days' time with seven cords of wood. The average cost for the last month was twelve cents per cubic yard for fuel used and labor employed, equivalent to about thirty cents per ton.

The ashes of garbage, and especially animal matter, have a positive value. Chemical analyses at the Agricultural Experiment Stations show that they contain from 5 per cent. to 12 per cent. of potash and phosphoric acid, being nearly equal to Canada wood-ash of the same bulk. The practical application of the ashes to land by farmers shows the value to be even more than is claimed. Under favorable conditions the value of these ashes should defray the cost of the fuel used in combustion.

There are four sizes of the Engle cremators, adapted to places from 2,000 to 30,000 population. When cities of the largest size adopt this method, two or more furnaces are built at different locations to save transportation of garbage. The cost of the cremators is governed by the varying conditions of locality, cost of material, labor, transportation, the kind of structure demanded by the special situation, etc., etc., but may be said to be extremely moderate in amount when compared with the large sums necessary to build works for other methods of disposal.

The sanitary performance of these cremators is beyond question. By reason of the location within the city limits, near to the collection field, the operation must necessarily be entirely sanitary, without smoke or odor, and creating no nuisance. In all the places where these cremators have been tried, and where managed as directed by the printed instructions of the Engle Company, there has never been any complaint lodged with the company from any unsanitary or offensive conditions created by the furnace. This may appear to be a strong statement, but is fully borne out by the facts, and the testimony on file from health officers and city authorities is very convincing upon this point.

The work done by the Engle cremators may be easily summed up. There have been twenty-eight garbage cremating furnaces constructed at twenty separate towns and cities, ranging in locality from the tropics to the extreme north of this country, and from the Atlantic to the Rocky Mountains. Of this number three have been replaced by larger constructions of the same kind; and in two places only has the use of the cremator been discontinued, and this from no cause connected with the furnace, but from other reasons.

The United States Government has adopted this form of cremator at two of the military posts, and the city of New York has found an Engle furnace indispensable in destroying, in the heart of the city, without offense, with no chance for the escape of disease germs, infected articles from persons sick with contagious diseases, as well as the waste of hospitals.

Finally, this method of disposing of the waste of cities and towns has been proved, by long-continued use here and abroad, to be moderate in

first cost for the plant, to be strong, durable and convenient in construction, to be able to destroy every class of city waste that fire will affect, to do this with speed, with freedom from nuisance, annoyance, with marked economy in fuel and labor, with some resulting product of value, and with the certainty of relieving the community, the authorities and the health department from the continual presence and menace of this most perplexing, annoying and dangerous waste.

It would seem reasonable to suppose that any city or town, where the disposal of garbage gives trouble or creates unsanitary conditions, might avail itself of this method of solving a problem which is not easy to deal with in any other way than by total destruction of the cause of the difficulty.

An Epidemic of Faith-Cure.

By Hon. Samuel T. Davis, M. D., of Lancaster, Member of the State Board of Health of Pennsylvania.

The title by which this paper is announced may sound ambiguous, but I expect to show it to be appropriate and even exact, in view of the facts that called it forth.

I do not expect to prove to you that the form of hallucination mentioned has, or will, become epidemic—common sense forbids that. But I do propose to demonstrate the relation of cause and effect, *a priori* and *a posteriori*, between the faith-cure delusion and the extension and high death-rate of contagious and infectious diseases.

It is not necessary or even proper to attack or defend the position that some honest people and more knaves are so fond of assuming, that those who have not the required sort of faith are disqualified as critics.

Grant that for the sake of peace; it remains true that each must act upon such wisdom as he possesses—walk by the light of his own lamp—and as in this question the wisest men of the entire historic period have been and are in accord, the majority rule will apply here for all the purposes of this discussion. Nor is it any more necessary to assert or deny the possibility or occurrence of miracles. Whatever may have been the fact in the past, miracles as against law do not occur in our days since all the asserted examples fail before even ill-conducted investigation. The right of religious belief or unbelief is justly sacred. However irrational my views may seem to my neighbor he is bound to treat them with at least formal respect so long, and so long only, as they do not lead me to infringe upon his or others rights. We concede right here that there are honest, sincere men and women who believe—more's the pity—that literally and exclusively "the prayer of faith shall save the sick," and that consequently the physician is an unnecessary evil. It is these more than any class who have called forth this attempt to meet the real question in the case.

As for the knavish charlatans who encourage this delusion for their own profit there can be but one opinion among sane people—their place is in the penitentiary, supporting themselves by hard labor by some honest handicraft. No intelligent man, especially a medical man, fails to recognize the importance, the value, the necessity in a certain class of cases of resorting to mental impressions as a means of relief. There is no difficulty either in comprehending how this may come to pass even if the process is obscure. But the line between this and the assumptions of the faith cure illusionists is broadly laid down.

Human reason, human judgment are of course superfluous, even as adjuncts to the direct operation of the Supreme Will, and as "faith moves the arm that moves the world," of course given the faith, no more is needed; indeed, any other remedial interference is impertinent presumption. Their logic would be all right if their premises were sound, but "there's the rub."

Now the educated class who, after all, dominate the whole public and shape the future of society ought to be far enough advanced to agree to one proposition which, once admitted, I think decides this question. Here it is: The supreme test of any theory is its outcome in practice under average conditions. If a thing won't work on a fair trial it wants mending; if mended and still fails it falls. Just here we part company with the literary advocates of faith-cure or Christian Science, as their bright lights choose to term it. They say: "We care nothing about given cases or any or all cases; we do not know all the conditions; we have God's promise, on that we rest." And we could afford to let them rest and the subject also if it affected none but themselves, for their folly would die with them, but we have a duty to our fellow-men—first, as members of the same human family, then as parties to the social compact, and last and above all, those of us who have the obligation of teachers of medical and sanitary science and conservators of the public health.

"To the law and the testimony," what are we offered in support of the theory? A case here and there of a nervous invalid whose enfeebled intellect, will power and bed-ridden body, roused by some sudden stimulus, has enabled him, or more frequently her, to rise up and walk. I will not insult your intelligence and good sense with the cases of fractured bones united in an instant, or dislocated joints, or the reconstruction of absent lungs, livers, spleens and other organs of the human economy, as these are merely evidences that Ananias and Sapphira had a large family before their final misfortune, and their characteristics have been perpetuated to this day.

Where are the evidences of positive arrest or mitigation of epidemics without proper sanitary measures? And when the greatest of modern investigators made a fair proposal that a special ward in some hospital be made the object of united prayer to test whether, under the same

conditions, any difference would be observed, why did it receive a unanimous negative, and even innuendoes as to its motive? On the other hand how many and how sad are the results of trusting to spiritual (so-called) remedies for physical evils! Their name is legion, and each of us could contribute one or more. But sometimes the facts take a shape that not only furnishes evidence but demands action, and such a case I have now to relate. I ask indulgence for suppressing names and precise locality; these proceedings are public and no good would be done by particularity; the facts are well in hand and will be furnished to any investigator. It is to be hoped that some of the persons concerned were transparently honest in their delusion, and some of them have not been enlightened even by the terrible consequences I am about to narrate. Their persistence in the face of such a calamitous sequence of events is, perhaps, the gravest feature of the case, and the one which is the best justification for taking your time for its consideration. The cold and unvarnished facts I obtained from a medical gentleman in the neighborhood as well as several of the most prominent citizens. In a certain school district within a few miles of the city of Lancaster, Pa., with a population of 35,000, a number of well-to-do and influential families hold "faith-cure" opinions. A case of diphtheria occurring in one of these houses, no physician being employed, the other children were allowed to attend school some ten days until the sick child was supposed to be dying, when the other children were kept at home to see her die. The next case was in a family living one-fourth of a mile from the first, the children attending the same school. Five cases occurred here, but as a physician was called at once only one died. Next two children of a brother of the first family took the disease. No physician and both died. Next a cousin's family of three children were stricken down. No physician and two deaths. Next the toll gate keeper's three children, first a little boy. No physician; died. Then a sister of the dead boy; no physician; recovered. A brother of the last two children, living away from home, came to see the little boy before he died; he wanted to kiss him, did so, and in a few days the visitor took ill and died; no physician called until a few hours before his death.

There were in all thirty cases in the neighborhood attended by physicians, seven of them dying, and eight cases treated by "faith-cure," six of them dying. All these cases were within a radius of about two miles; all the children of school age attending the same school: the teacher belonging to the faith-cure clique, and a sister of one family afflicted and cousin of two others. She visited freely during the epidemic, and permitted the children of the first family to attend school after its appearance at home. When the school board were informed of the facts she was required to discontinue her visits and exclude children of affected families. Meanwhile, the families of the clique, sick and well, interchanged visits, met for prayer; public funerals were held for the

diphtheria victims; and though the bodies were not taken into the church, friends and relatives assembled at the houses of mourning to eat together, as is the custom in the country. While attending a case in the house where the first two cases occurred, my informant learned that not even simple household remedies were permitted, such as greasing the throat and neck, teas, etc.

In God's name, is it possible in this enlightened age, that we must be called upon to record such acts of cruel negligence, and within the confines of the Commonwealth of Pennsylvania! Here is a neighborhood invaded by a destroying scourge; no attempt made to arrest it; no fundamental law to protect the helpless innocents! The school a center of infection, and every means of spreading it in full operation—public funerals, free visitation, no isolation of cases, no human means used. What results could follow but those recorded? Families dismembered; lives sacrificed; homes desolated; helpless children deprived even of paternal ministration. It is with the utmost difficulty that one can hold himself down, even in cold black and white, to permissible expression of contempt for the folly, and indignation for the presumption of those who are responsible for such events. We seem to hear the blood of neglected innocence crying from the silent tomb for vengeance—not on their deluded parents and friends, for whom we ought, perhaps, rather feel compassion, but for the knaves and charlatans who stand behind them, and the country which does not protect their young lives from the fell destroyer when possible to do so. I must not omit stating that these believers in "faith-cure," who meet weekly in one another's houses for prayer and consultation, have several among them who have been to New York for instruction, which is given free, but a "voluntary fee" is accepted and, no doubt, expected.

I cannot trust myself to comment further on this subject. The practical question is one of duty. What are we going to do about it? If we, as physicians and sanitarians, have any duties to the public, it would seem we need look no further for one of them. It is only justice to the State Board of Health to recall that for the last seven years, or since the Board was established, we have been knocking at the deaf ear doors of the Legislature, with our hands on our mouths and our mouths in the dust, praying and imploring it to give us authority to organize local boards of health in every school district in the State. Our supplications have received the cold shoulder, and hundreds of lives are being yearly sacrificed through contagious diseases in the several districts which might be averted. In view of such facts as those narrated, every one of us should be inspired with new zeal to create a healthy public sentiment that will demand and secure proper legislation for the protection of the first object in search of by the framers of our constitution—life—without which "liberty and the pursuit of happiness" don't count.

What is the most practical method? A friend, with whom I discussed this matter, coolly remarked: "Well, the refusal of tested and approved means of relief in sickness is suicide; we can't punish that, and it is a good riddance of fools. But the denial of such means to others, especially to helpless children, is murder, and should be punished as such.' The logic is sound, and many of us are ready to say amen to its conclusion; but public enlightenment and public conscience are far behind that standard, and we must deal with things as we find them. What is the present scope of practical legislation? Several things, the more important of which I briefly note:

(1) All cases of contagious disease to be reported to constituted sanitary authorities, and enforced by penalty.

(2) Compulsory isolation of contagious diseases.

(3) Prohibition of public funerals in contagious diseases—enforced by penalty.

(4) Exclusion of children of infected families from schools and public gatherings--enforced by penalty.

(5) Application of the laws governing the practice of medicine to the so-called teachers and practitioners of healing the sick by faith-cure, Christian science, or whatever name they may assume.

There is nothing in this that should call out objection from any one, and when I proceed to dispose of objections that will be made, it is not for your instruction but to complete the subject as addressed to the public. I make no apology for radical measures, having been long ago satisfied that no others avail in dealing with serious evils.

We shall hear much of interference with "personal liberty," "constitutional privilege," "religious rights," and so on. Fortunately the highest authority has covered a large portion of this ground in dealing with another question. The Mormons, of Utah, raised a definite issue of religious privilege against national law, and the highest tribunal decided it upon ground broad enough for the purpose here proposed. So I have only to add: What is a government good for, that cannot, or will not prevent the diffusion of deadly poison among its defenseless subjects? Why may I forbid my neighbor to dump garbage before my door if he may send his children to carry diphtheria or scarlet fever into the school among my little ones? The questions answer themselves; the Supreme Court has covered them, and I can afford to leave them right here.

But we are told that such legislation, if at all practicable, will be inquisitorial, expensive, and therefore unpopular and short lived. Inquisitorial, perhaps—there is such a thing as too much freedom of some individuals in all communities, which means oppression to the mass, and a little inquisition in our case would have prevented far greater evil. Socialism is undeniably right in holding that what is needed for all must be conceded by each. Expensive? Somewhat, no doubt. But

how much more expensive the neglect? Will the objector estimate the cost of the young lives sacrificed in the faith-cure epidemic I have described, and then count the few dollars for proper sanitary protection? Unpopular? That is a question of fact. A generation ago the free school system was fought on the same ground; this year the State gives five millions. The evolutionists stand on impregnable ground when they compare the facts of past and present. When Abraham made his son carry up the hill the wood with which he proposed to burn the boy's murdered body, "his faith was counted to him for righteousness," but it was in an age when the people around him sacrificed their first-born to idols. A few years ago a Massachusetts fanatic sacrificed his little daughter for the same asserted reason, viz: Divine command, and his faith was counted *him* for a residence in the penitentiary, escaping the halter from doubt of his sanity. By this time let us hope Pennsylvania is ready, at the coming session of the Legislature, to follow that worthy example by adopting measures to prevent and punish all forms of child murder, whether arising from cruelty or superstition. Short-lived? Never believe it. Give us competent sanitary laws for a few years, and an intelligent Governor would protect us from repeal; and the people once feeling its benefits, would bury any man offering to interfere with it so deep that his contaminating influence would never be able to appear above the surface.

My justification for taxing your patience so long is found in my own appreciation of the grave importance of the subject, and I hope it may be fully discussed, and its main objects may find place in your Committee on legislation.

Microscopic Examination of Water from Public Water Supply of Erie, with Remarks Thereon.

David N. Dennis, M. D., of Erie, Pa.

From the published title of my subject I fear you will expect from me some lengthy and accurate microscopical and biological analysis of the city water. I do not profess to be an expert in this line, and only wish to give some points for discussion and put forward a theory. Is our water good or bad? Twelve years ago it was excellent.

Some two years ago a member of my household contracted typhoid fever. For my own satisfaction and the safety of my family, I took a specimen of water from the hydrant in the kitchen, placed it in a bottle that had been washed with a solution of bichloride of mercury, and then thoroughly washed with boiling water. This was filled with the city water, sealed and sent to Philadelphia for examination. The chemist and biologist who examined the specimen is a gentleman with whom I am personally acquainted, and one whose word I can thoroughly trust.

After the examination he sent me a letter, of which the following is an extract:

"The water received from you is in very bad condition (underscored) and, moreover, contains recent cesspool drainage. I am of the opinion that it is well water and carries the dejecta from typhoid sickness. Please advise me as to the facts, location and surroundings."

Shortly after this, possibly a month, the water commissioners of this city sent a number of sealed packages of water taken from the bay and from private wells for analysis. The specimens were sent to the same chemist who examined my specimen. After making the examination the report thereof was sent back when, strange to say, the bay water was free from sewerage matter and germs. The well water was polluted in nearly every instance, and in some numerous typhoid germs were found.

The theory which I wish to put forward to explain this seeming difference in the examination is this: The specimen sent by me was taken after a severe wind storm. The water was very oily and filled with sediment. The specimens sent by the commissioners were taken from the bay when the water was clear. The inference is that the sewerage contained excretions from a score or more of typhoid and dysentery cases which would empty into the bay from the several main sewer pipes. This would, as a matter of fact, precipitate if the water was calm and an exceedingly small percentage float away, as there is very little current in the bay. During a storm the water, as you know, is very rough and the waves run high. The sewerage which had precipitated and the sewerage which was being emptied during the disturbance would now be churned and thoroughly mixed with the water. Thus, should a specimen be taken at that time it would show all the germs that were being emptied into it. This, I think will explain the seeming difference in the examinations.

The question of the advisability of emptying the sewerage into the bay I think can scarcely be argued. When a pumping station is situated a few hundred yards away from the main sewer I doubt if any one would try to argue that it was wholesome, much less pleasant to contemplate As the city increases in population the evil, of course, will increase as the water in the bay will, in time, get to a point nearing saturation, when the sewerage matter will not precipitate as thoroughly as it does now, and when a quantity of free matter will be directly pumped up and served throughout the city with the water supply. If the water is taken from the bay the sewerage should be emptied into the lake or disposed of in some other way; or better still, the city water supply taken directly from the lake, where there is no chance of contamination, and the bay receive the sewerage.

If this paper succeeds in drawing out the ideas and opinions of the gentlemen present who are versed in these matters, and if the inhabi-

tants of the city can thereby gain pure and more wholesome water, it will have served its purpose.

TYPHOID FEVER AND IMPURE MILK.

LEWIS H. TAYLOR, M. D., *of Wilkes-Barre, Pa.*

Among the different causes of enteric fever, the use of infected milk has long been known to play an important part, and from time to time, in the course of epidemics, cases have appeared whose existence could not be explained on any other hypothesis than that the patients had used milk contaminated with the germs of the disease. A few local outbreaks have been reported in which the source of the disease in nearly all of the cases seemed to be found in the milk supply, but such instances have been rare, and when an extensive epidemic of typhoid is reported, we are generally quite apt to find polluted water playing an important part in its causation. So apt is this to be the case that any inquiry into the cause of a fever outbreak would not be regarded as complete until a thorough inspection of the water supply had been made.

When, however, such investigation shows the chief general cause to be free from suspicion, we naturally turn to the second most frequent cause, and investigate the milk supply of our patients. A history of the epidemic I am about to relate will, I trust, be of sufficient interest to be its own excuse for presenting this paper to your meeting to-day.

Early in the month of October, 1891, a number of cases of typhoid fever appeared in the borough of Nanticoke, most of them in the upper or best portion, from a sanitary point of view, of the town. New cases appeared from time to time through October and November and into December, but it was not until the epidemic had almost ended that the attention of the State Board of Health was called to the matter, with the request that the same be investigated.

I received instructions from the Secretary of the Board December 25, 1891, to investigate the outbreak, and report thereon as soon as possible. I began my investigations the next day (December 26), after receiving the order, and on December 28, addressed the following letter to each of the physicians of Nanticoke, asking a series of questions bearing upon the disease in their midst:

"WILKES-BARRE, PA., *December 28, 1891.*

"MY DEAR DOCTOR: Will you kindly give me, on behalf of the State Board of Health, at your earliest convenience, the following information concerning the prevalence of typhoid fever in Nanticoke:

"First. Have you treated any cases of typhoid fever in Nanticoke since October 1, 1891? If so, how many?

"Second. Please give name, age, sex, residence, date of attack, and result of treatment of each.

"Third. Will you please state what water supply was used by each; whether the public supply or well water? Also the milk supply of each? From whom obtained? Were any of your patients in the habit of boiling their drinking water before using?

"Fourth. What method of disinfecting stools was used, if any?

"Fifth. Was the house connected with sewers? If not, in what way was refuse disposed of?

"Sixth. What is the general sanitary condition of the neighborhood in which the cases occurred?

"Seventh. Did you attend any cases of typhoid in Nanticoke prior to October 1?

"I will consider it a personal favor if you will reply to this at your very earliest convenience. Any other information you may be able to give on this subject will be gladly received.

Very truly yours,

"Lewis H. Taylor."

From the replies received, I found that Nanticoke had been remarkably free from typhoid fever for a long time previous to October of the year just closed. The first case appeared September 27, and the next after that, October 2. From that time to December 11, there appeared, as shown by the reports of the physicians, forty-nine cases. Dr. Meck also reported having treated a number of "typho-malarial" fever, but none that he could call typhoid.

As stated in the beginning of this paper, whenever an epidemic, limited or extended, of typhoid fever occurs, we first ask the question, "What water did the patients drink?" and if this seems above suspicion, the next question that naturally arises in our minds is, "What was the source of their milk supply?"

Of the forty-nine patients reported, seven used well-water, and forty-two used the public supply taken from Harvey's Creek (See Table 1). Of the seven who used well-water, one contracted the disease away from Nanticoke, one was among the early cases in Nanticoke, and the remaining five, judging from dates of their attack alone, would clearly be classed as secondary cases, due no doubt, to contaminated well-water. Whence came the infection of the remaining forty-two cases? Why not from drinking polluted water from the public supply? I find upon investigation that Nanticoke, formerly supplied, as villages usually are, by wells, was for a time largely supplied with water pumped directly from the Susquehanna river, but since 1886, the year following the Plymouth epidemic, the supply has been taken from Harvey's Creek, the outlet of Harvey's Lake, the largest body of water in the State of Pennsylvania.

This stream flows, in the main, through a sparsely settled country, a large portion of which is mountainous and wild. Early in January, in company with Mr. Moseley, superintendent of the Water Company, and Dr S. L. Holly, of Nanticoke, I followed the stream five miles up from its mouth toward its source. It is a stream estimated to have an average daily flow of 12,000,000 gallons, and in its present state has evidently much above that figure. The reservoir or intake of the water company is situated about two miles from Nanticoke, on the opposite side of the Susquehanna river, and from this point the water is piped to and across the river to the pumping station of the company. Here it enters a receptacle, or well, twelve feet deep by fifteen in diameter, in such manner as to allow all heavy sediment to settle to the bottom. The overflow from this, passes into a second well, and a current of several inches from the top of well No. 1 into well No. 2, and on out into the waste water-way, carries off any light, floating material, such as leaves, sticks, etc., that may possibly have passed through the screens and into the pipes at the reservoir. From the top of well No. 2 the water is pumped through a fine wire screen at the rate of two to two and one-half million gallons a day, up the hill and into a standpipe five feet in diameter and fifty-four feet high. From this it is distributed to the town. The arrangements at the pumping station are most excellent. A constant stream of running water, abundant in quantity, and apparently excellent in quality, is kept passing through the wells before entering the pumps. The wells are cleaned on an average once a month, and any accumulated sediment thoroughly blown out. This, of course, does not necessarily exclude the water from being factor in producing typhoid fever, though it does secure a water supply free from any gross impurities. There are reasons, however, which to my mind exclude the public water supply from a share in causing the present epidemic.

First.—I followed the stream for three miles above the reservoir and examined the location of closets, etc., in reference to contamination from cesspool drainage. For a long distance the stream flows through a narrow valley with precipitous wooded hills on either side, and without any houses or chance for the same near its banks. The first house encountered was at Schooley's saw-mill, about a mile above the dam. Here the closet was probably 200 feet from the stream and not in a dangerous location. A half mile further up we found, in the neighborhood of Frisbee's mill, six or seven houses, but in all but one, the closets are at a safe distance from the stream. The exception is located fully forty feet away and is of such a character that no contamination at present need be feared from it (Its owner promised to use all due diligence to keep it disinfected and offered to move it if we thought it dangerous.)

The next houses encountered were at Ceasetown, three miles above the reservoir. Here there are ten and at all of them, strange to say, but

one, the closets are at a safe distance from the creek. The exception is at quite a distance from the main stream, but is situated right over a little tributary in such a manner that its refuse is constantly washed away into Harvey's Creek. The owner promised to remove it at once. Inquiry showed that there had been no typhoid fever in any of these houses along the stream, nor, as far as could be learned, had there been any cases farther up the valley. I did not follow the creek farther than Ceasetown, but learned from the inhabitants that the houses farther up were very few, and in general are situated back from the stream. Inquiry of the physicians who practice along the valley, did not reveal the presence of any cases of typhoid anywhere along the stream, hence I concluded that in the absence of any positive evidence of contamination, we may at least infer that the water was reasonably pure.

Second.—The large volume of water in the stream at all seasons of the year, and the long distance it flows through sparsely settled country before entering the water company's pipes, would render it a reasonable safe source of supply.

Third.—I find on the western side of the Susquehanna river, viz., at Avondale, Grand Tunnel and the upper part of West Nanticoke, from 100 to 150 families supplied with water from Harvey's creek and none of them had typhoid fever during the time of the Nanticoke outbreak.

Fourth.—The borough of Nanticoke has from nine to ten thousand people who are supplied with water from Harvey's creek. If the water were at fault, we would reasonably expect the cases of fever to appear all over the town instead of in a limited portion, and especially would we expect all that portion lying along Main street and still lower toward the river, which would naturally receive water from the dead or less active portions of the water pipes, to be affected equally with that portion of the town situated on the hill; such was not the case.

For the above reasons I think we may reasonably conclude that the public water supply did not cause the typhoid fever of the past few months.

We turn to the second question and ask: "What was the milk supply of these patients affected with the fever?"

Of the remaining forty-two patients who used hydrant water, we find that thirty-one used wholly or in part the milk supplied by a farmer living three miles above Nanticoke, and there is good reason for believing that many others drank also from the same milk. There is situated in the neighborhood where many of the cases occurred a prosperous drug store, where milk-shake was dispensed during the summer and fall as a popular beverage, and the milk for the same was furnished by the same farmer who supplied the majority of the typhoid fever patients. Several of the local retailers also were in the habit of purchasing milk from the same farm for a portion of their supply.

In the accompanying table I have classified all of the cases reported to me by the physicians of Nanticoke.

Table I.—Typhoid Cases in Nanticoke, in 1891.

No. in order of attack.	Age.	Sex.	Residence.	Date of attack	Result.	Water supply.	Milk supply.	Method of disinfecting.	Disposal of excreta.	Sanitary surroundings.	
1	35	F.	Green St.,	Oct. 7,	Died,	Hydrant,	Mr. T. and Mrs. B.,	Brom chlor.,	Privy,	Bad.	
2	10	M.	Broad St.,	2,	Recov.,	do.	Mrs. B.,	Carbolic acid,	Buried.	Good.	
3	20	M.	Noble St.,	4,	do.	do.		Chlo. lime,	Privy,	Fair.	Disease contracted at Winton, Pa.
4	20	M.	Church St.,	4,	do.	do.	Mr. O.,	do.	do.	do.	
5	15	M.	Green St.,	10,	do.	do.	Own cow,	do.	do.	do.	
6	15	M.	Green St.,	10,	do.	do.	Mr. T.,	do.	do.	do.	
7	8	M.	Prospect St.,	11,	do.	do.	Mr. T.,	Lime and fe. sulph.,	Buried,	Good.	
8	14	F.	Green St.,	11,	do.	do.		do.	do.	do.	
9	17	M.	State St.,	12,	do.	do.	Mr. T.,	Carb. acid,	do.	do.	
10	35	M.	Green St.,	12	do.	do.	Mr. T.,	Br. chloralum,	Privy,	Bad,	
11	17	M.	Church St.,	12,	do.	Well.	Mr. T.,	None,	do.	do.	
12	14	F.	Green St.,	13,	do.	Hydrant,	Mr. M.,	do.	do.	do.	From Mr. T. occasionally.
13	24	M.	Church St.,	13,	do.	do	Mr. W.,	Lime & sulph. iron.	Buried,	Good.	Drank T. milk also.
14	14	M.	Green St.,	14,	do.	do.	Mr. J.,	do.	do.	do.	do.
15	21	F.	State St.,	14,	Died,	do.	Condensed milk,	Br. chlor.,	Privy,	Bad.	
16	36	M.	Broad St.,	14,	Recov.,	do.	Mr. T.,	do.	do.	do.	
17	8	M	Green St.,	15,	do.	do.	Mr T.,	do.	do.	do.	
18	40	M.	Noble St.,	17,	do.	do.	Mr S.,	Ch. lime.	do.	Good.	Father of No. 3.
19	51	M.	Main St.,	25,	Died,	Well,	Own cow,	Sulph. iron,	Buried	do.	Cont. disease at Winton, Pa.
20	33	F.	Broad St.,	26,	Recov.,	Hydrant.	Mr. T. and Mrs.,	None,	do.	Bad.	Part of time Mr. T.
21	20	F.	State St.,	Nov. 2,	Died,	do.	Mr T. and B.,	Carb. acid,	do.	Good.	
22	2	M.	Church St.,	7,	do.	Well,	Own cow,	Br. chlor.,	Privy,	Bad.	
23	19	F.	State St.,	5,	Recov.,	Hydrant.	Mr. T.,	Sulph. iron,	do.	Good.	
24	23	F.	Green St.,	9,	do.	do.	Mr. T.,	Br. chlor.	do.	Bad.	Milk also from Mr. M.
25	22	F.	State St.,	8,	Died,	do.	Mr T.,	Carbolic acid,	Buried,	Good.	
26	33	M.	Honey Pot.,	15,	Recov.,	Well,	Neighbor,	Chlor. lime,	Privy,	Fair.	
27	12	F.		15,	do.	Hydrant,	Own cow,	do.	do.	Fair.	Niece of No. 8, and visited his house frequently during his illness.
28	30	F.	Main St.,	15,	do.	do.	Mr. D. and T.,	Br. chlor.,	do.	Good.	Sup. and part by Mr. T.
29	6	M.	Church St.,	27,	do.	Well,	Own cow,	None,	Buried,	do.	
30	20	F.	Broad St.,	28,	do.	Hydrant.	Mr. T.,	Sulph. iron,	Privy,	do.	
31	30	F.	Church St.,	30,	do.	Well,	Own cow,	Br. chlor.,	Buried.	do.	
32	24	M.	State St.,	30,	do.	Hydrant,	Mr. T.,	do.	do.	do.	
33	4	M.	Church St.,	Dec. 2,	do.	do.	Mr T.,	do.	do.	do.	
34	6	M.	Market St.,	1,	do.	do.	Neighbor,	Chlor. lime,	Privy.	Fair.	
35	17	M.	Prospect St,	1,	do.	do.	Mr. T.,	Lime, etc.,	do.	Good.	
36	2	M.	Green St.,	2,	do.	do.		do.	do.	do.	
37	25	M.	R. R. St.,	6,	do.	do.	Mr. T.,	Sulph. iron,	do.	do.	
38	51	F.	Green St.,	8,	do.	do.	Mr. T.,	do.	do.	do.	
39	32	F.	Green St.,	8,	do.	do.	Neighbor,	do.	do.	do.	

Table I.—Typhoid Cases in Nanticoke, in 1891.—*Continued.*

No. in order of Attack.	Age.	Sex.	Residence.	Date of attack.	Result.	Water supply.	Milk supply.	Method of disinfecting.	Disposal of excreta.	Sanitary surroundings.	
40	6	F.	State St. . . .	Dec. 8. . . .	Recov. .	Hydrant.	Mr. T., ...	Chlor. lime. . . .	Privy, ...	Fair.	
41	31	F.	State St. . . .	11, . . .	do. . .	do.	Mr B.	Lime, ...	Buried.	Good	
42	20	F.	. . . . .	Since Oct. 1,	do. . .	do.	Mr. T.	Chlor. lime, ...	Buried or privy	do.	
43	20	M.	. . . . .	do.	Died, . .	do.	Mr. T.	do.	do.	do.	
44	5	M.	. . . . .	do.	Recov. .	do.	Mr. T.	do.	do.	do.	
45	17	M	. . . . .	do.	do. . .	do.	Mr. T.	do.	do.	do.	
46	19	F.	. . . . .	do.	Died. . .	do.	Mr. T.	do.	do.	do.	
47	28	F.	. . . . .	do.	Recov. .	do.	Mr. T.	do.	do.	do.	
48	13	F.	. . . . .	do.	Died. . .	do.	Mr. T.	do.	do.	do.	
49	. .	M.	. . . . .	do.	Recov.	do	Mr. T.	do.	do.	do.	

In analyzing these cases as tabulated, we find, first of all, that Nos. 3 and 19 contracted the fever at Winton, Pa, and came home to Nanticoke sick with the disease. Hence, in a consideration of the causes of the epidemic in Nanticoke, these two should be ruled out of the list.

No. 18 was father of one of these cases, and came down with the fever thirteen days after his son began. He might possibly be classed among the secondary cases from carelessness in management, though the physician had instructed the family to use chloride of lime as disinfectant.

No. 27 was a niece of this family and frequently visited them during their illness. If the above four be omitted, we have left forty-five cases to be considered; of these twenty-seven were supplied with milk from the above-mentioned farm directly.

Of the remaining eighteen, Nos. 12, 13 and 14 drank milk also occasionally from the same farm.

Two Polish children, Nos. 8 and 36, are reported as, source of milk unknown. It is very difficult for the physician to ascertain all of the facts from some of the foreign population who do not speak any English, as they cannot understand the meaning of the questions, nor the necessity of correct answers in any investigation.

This leaves twelve who are reported as having milk from their own cows, from neighbors or from dealers other than the one above mentioned. Of these, six used well-water instead of the public supply, and four of them are cases in which the origin of the infection may be clearly traced.

Edward C. (No. 11) was clerk in a drug store, where milk-shake was used freely as a beverage. He drank of this milk, which was supplied by the farmer mentioned, and was taken with fever Oct. 12. He lived with his sister, in whose family Nos. 22, 29, 30 and 31 were attacked respectively Nov. 7, 27, 30, and December 2: clearly cases of secondary infection from infected well-water from the introduction into the house of case No. 11. The physician in attendance says the water was gotten from an old well five or six feet deep, just back of the house and in a location to catch all the drainage from the surface under and around the house. In this case excreta were thrown on the surface and in privy vault, and no disinfectant was used until the patient had been ill for some days. If these four should be regarded as secondarily, due to this farmer's milk, it would make thirty-five out of forty-three cases, or over 80 per cent., probably due directly or indirectly to the use of this milk.

As to the remaining cases, who are reported as procuring milk of different dealers, it can by no means be asserted that they did not drink of the same, for many people were in the habit of drinking milk at the drug store above mentioned, and may thus have used it without being reported.

An interesting incident is found in the family of Dr. D., who procured his milk from a different dealer. In the hot summer and autumn evenings he frequently went over to a local retailer and purchased a quart of milk as an additional supply. This was drunk before going to bed. His wife was taken ill with typhoid fever, and his mother-in-law, who was staying with them for a time, was also taken ill, went to her home in another town and died of typhoid fever. Inquiry revealed the fact that the milk purchased from the local retailer came from the suspected farm. While it is impossible to say with absolute certainty that the epidemic was caused by milk supplied from this farm, yet the fact that so large a portion of the cases used this milk is sufficient to cast considerable suspicion on the milk supply, and warrant an investigation of the same.

Accordingly, accompanied by Dr. S. L. Holly, of Nanticoke, I visited the place mentioned, had an interview with the owner, looked over his premises carefully and procured a sample of the water from his well, which I forwarded by Adams Express to Dr. Leffmann for examination.

I found that Mr. T. kept a dairy of thirteen cows, from which he supplied milk to his customers in the borough of Nanticoke, and that he was the milkman supposed by many to have distributed typhoid fever among certain residents of the place. Two years ago a passing drove of cattle halted at his place and pastured on his farm about a week. In about two weeks after his own cows began to be ill and his whole herd of thirteen died in a short time. This was investigated by the State Board of Agriculture and the disease pronounced Texas fever.

Mr. T. has lived in his present location seven years and his family has had no serious illness in that time until October of 1891. He was taken sick himself October 4, at the same time the outbreak began in Nanticoke and was ill with typhoid fever for seven weeks. His son, aged 5, was also taken sick, October 4, and ill for four weeks. L. S., aged 15, relative in the same house, was taken sick October 7, and was ill for three weeks. Mrs. T., his wife, was taken sick October 11, ill for three weeks. C. S., aged 20, a relative who came to the house about one week after Mr. T.'s illness began, was taken sick November 26, and was still in bed, though convalescing at the time of the investigation. These all had well-marked typhoid fever.

Mr. T. and family, with others, have used the water from his well constantly until taken ill and then the sick ones were supplied with water carried from a spring some distance away. Mr. T. does not know of any typhoid fever occurring previously in this house and thinks there has been none for twenty-five years, though I afterwards learned from Dr. Dodson, of Nanticoke, that he had taught the neighboring school ten years, and had had typhoid fever from using water of this well and that others in the neighborhood had the disease at that time. The other end of the farm-house is occupied by another family who use the water

from the same well. At the time of the investigation three of this family were ill, but their attending physician did not pronounce the disease *typhoid fever*. The first of these, G. K., aged 29, was taken ill on Thanksgiving day, had headache, nosebleed and diarrhœa. He was ill three or four weeks, was then up about four days and is now down again.

Mrs. E. K. was taken ill November 28, with "inflammatory cold;" sick two weeks; up three or four days and then "took cold and relapse with pneumonia." (?) She is now quite well, very dull and sluggish, sordes on teeth, dry tongue, etc. These used the well-water until illness began and since then have used spring-water. In a house a few yards away a family of three lived, and also used water from this well. None of them were reported as having typhoid. A daughter, aged 20, died, October 12, 1891; said to have died of heart disease.

The pupils of a public school, situated a short distance above this farm, were supplied with drinking water during the day from the well up to the outbreak of the fever, but, so far as known, none of them contracted the disease.

This local outbreak is of great interest of itself, aside from any influence it may or may not have had on the spread of the disease in Nanticoke, and the query naturally arises, what was the source of this infection? Mr. T. states that none of his family had been away from home for some time, except himself. He had been in Beach Haven about September 1 and stayed two nights, but did not know of any typhoid fever being there at the time. He sold milk in Nanticoke daily, and drank freely of the water. His wife, who contracted the disease within a week of himself, had not been away at all nor had his child. The other two, L. S. and C. S., came from Berwick to the farm and contracted the disease sometime after their arrival. Thus far the origin is obscure. A huckster from Beach Haven frequently passed through this neighborhood and stopped with Mr. T. He was there and spent a night about September 1 and again about September 15. At the time of the latter visit he was complaining of headache, general aching, lassitude, etc. He went directly home; was immediately taken down with typhoid fever and was ill four weeks. It is quite possible that he was commencing with the disease at the time of his visit and if so, this would serve as the parent case at the farm, the subsequent ones developing early in October.

After the patients had been ill for a short time a nurse was procured, and the stools disinfected, but previously they had been thrown into the privy, which is situated below the well so far as surface is concerned, and on ground sloping toward the river, and away from the house and well.

The privy is situated forty-five feet from the rear of the house and one hundred and twenty feet from the well, the ground sloping toward the privy, so that it is considerable below the top of the well. Remarkable circumstances for a house in the country.

Appearances would indicate that the privy would not pollute the well. The later is twenty-four feet deep and Mr. T. assures me that he ascertained when draining the well that the water came into it from the opposite side to the privy—*i. e.*, from toward the barn.

A few hundred yards from this well, and on considerably higher ground, is a large cemetery, which is used much more than country cemeteries generally are. It is located in a populous valley and many of its lots are owned by families who have moved into the adjoining towns, but still bury their dead in the old cemetery. There is a shallow gully or depression in the ground between the farm-house and the cemetery, the ground sloping toward it from either side; but the well, although higher than the gully, is still much lower than the cemetery. The accompanying crude diagram will show the location of the various places mentioned.

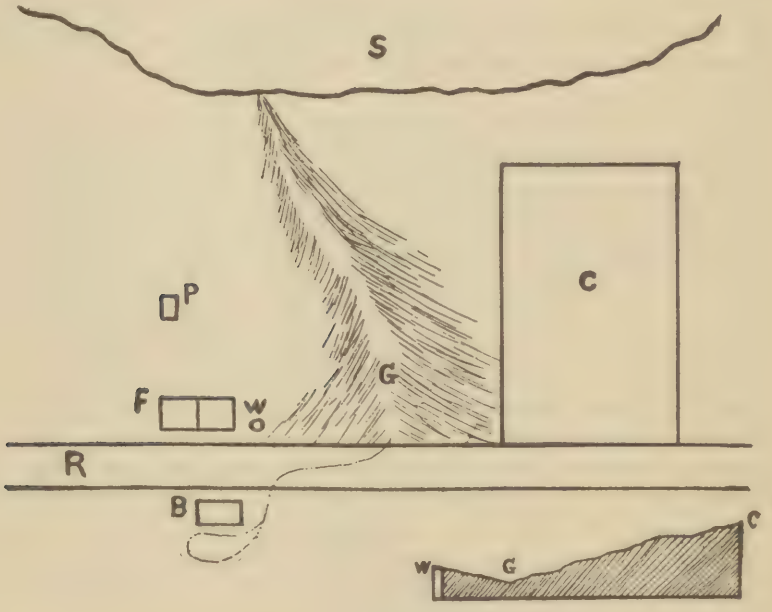

Diagram of slope from cemetery to well.

F. Farm house with two families.
P. Privy, used in common.
W. Well.
B. Barn, the drainage from which is across the road, and eventually in the gully, G.
R. Public road between Wilkes-Barre and Nanticoke.
S. Susquehanna river.
C. Cemetery.

The distance from the cemetery to the gully is 357 feet, and from the gully to the well is 230 feet. Over in the cemetery, where the sexton was digging a grave at the time of our visit, the slope of rock was found

to be toward the farm-house, and subsequent investigation by digging near the well showed that the same dip continued on the opposite side of the ravine—*i. e.*, toward the well.

The sexton, who has lived within the cemetery grounds for three years, does not know of any recent burials from typhoid fever, except in the month of December last. Of course, it is impossible to say that the well is polluted by the cemetery. We have always thought that burial was one of the safest means of disposal of typhoid-germs; but who can tell how far such may be carried underground when circumstances favor their distribution? Certain it is that this well was contaminated in some way from the fact that so many who drank of its water were affected with typhoid fever. The following report from Dr. Leffmann offers additional confirmation of this suspicion:

"Benj. Lee, M. D., *Secretary of State Board of Health of Pennsylvania:*

Dear Sir: "The following are the results of an examination of a sample of water sent by Dr. L. H. Taylor, Wilkes-Barre, Pa., marked 'T——'s well:'"

Chlorine,	50.40
Nitrogen as nitrates,	12.60
Nitrogen as nitrites,	none
Nitrogen as ammonium,	0.005
Nitrogen by permanganate,	0.080

Clear and colorless.

"The above results correspond with those usually obtained in the examination of well-waters in populated districts, in which the subsoil water is largely polluted by infiltration of foul matters, but in which the soil is still capable of oxodizing the organic material to the final point—*i. e.*, nitrates. The high figure for the nitrates and chlorides, the low figure for the organic matters and ammonium compounds and the entire absence of nitrites indicate these conditions. Notwithstanding the fact that the ingredients in this water are not positively injurious, I regard it as unsafe for drinking purpose, because of the evidences of previous contamination, which may become at any time too great to be properly removed by the soil action. In addition, the introduction of specific contamination, such as the bacillus typhosus, is liable to occur and distribute the disease among those using the water. All figures in the analysis are in parts per million.

"Yours,

(Signed) Henry Leffmann."

The water from this well was used by the family without suspicion up to the time of the illness, and also used for washing and cooling the cans which supplied the milk to customers in Nanticoke. When we take into consideration the fact that so many cases of fever were found among families supplied with milk from this farm, that many cases were

found at the farm itself about the same time, and that the water of the well was in unsatisfactory condition even so late as January 1, I think we may safely say, that suspicion strongly points to the milk used, as the cause of the outbreak in Nanticoke.

Such was the opinion held by all of the physicians of Nanticoke with whom I conversed on the subject. The following is an extract from a letter received from Dr. D. H. Davis, under date of January 7, 1892. After detailing his case, he further says: "With the exception of G., all of these cases occurred in the southern or hill-portion of the town, where the sanitary conditions are as good as possible, consistent with the absence of sewers. It is the opinion of the local physicians, myself included, that the epidemic is largely due to the milk supplied by Mr. T. While an analysis of my own cases will not justify such an assumption, the history of the aggregate of the cases, with reference to this point will, I think, do so. Furthermore, it is known that T. has furnished other dealers with milk from his own supply. Among the cases which occurred in town were those of two boys, P. and B., who were employed in a cigar store beneath my office, and whom I almost daily saw, go to T.'s wagon and drink their fill of milk. They were attacked almost simultaneously with the appearance of the disease in T.'s own family. I did not attend any cases of typhoid fever during the past summer previous to October 1, and six cases will include all the instances in which I have treated the disease or known of its existence in the town since the introduction of the public water supply (probably six years) prior to the 1st of October. I know of but one case having occurred in Grand Tunnel, a boy who had been abroad previous to his attack. This fact, I think, militates against the assumption that the water supply was responsible for the appearance of the disease."

Inquiry of physicians and others show that, while the borough is by no means in an ideal sanitary state, yet its general sanitary condition is as good as can be expected without sewers, and was as good in the year just passed as in previous years.

Upon inquiry as to the ice supply, I found that it was furnished by two dealers, who obtained it partly from the Susquehanna river, partly from the Glen Lyon reservoir and partly from a pond filled by the Nanticoke Water Company. Inasmuch as the supply of ice was general and the epidemic local, it seems impossible that it should have figured in the causation of the disease.

In the absence of any other discoverable cause, in the presence of the fact that typhoid-fever was prevalent in Mr. T.'s own family and that it appeared in so many families of his customers, his well was condemned, and the family ordered to discontinue the use of this water for drinking purposes and for washing milk-cans unless it be previously boiled.

Notes on the Sanitary Condition and Necessities of Pittsburg.

Crosby Gray, Chief Clerk, Department of Public Safety, Pittsburg, Pa.

Upon no other single factor does so much of the material prosperity of a community depend as its hygienic condition. It may in all other respects highly commend itself, but if from any cause its sick or death rate be excessive, it will be carefully avoided and shunned.

The natural elements which are necessary to make up a healthy locality are pure air, pure water, a pure soil, and pure food. These were all originally bestowed in abundant measure by the Creator, but as populations increased, and especially as people congregated in cities and towns, the natural conditions were changed, and in consequence the sick and death rates were proportionately affected, as the changes were great or small.

The first three natural and essential elements mentioned, are so closely allied, or depend so greately upon each other, that they may be classed in the same category, and viewed and treated from the same standpoint. Thus, pollution of the soil involves contamination of the air and water; contamination of the water involves that of the air and soil; while that of the air involves, to a greater or less degree, the others.

The necessity for action looking toward the prevention or amelioration of these conditions was early recognized, and measures were adopted for the preservation of the essential elements in their original purity, so far as possible. One of the earliest enactments of this character was of directly divine origin, delivered through the medium of the "great lawgiver," to the Israelites.

In modern times, and especially during the past quarter of a century, the conservation of the public health has largely engaged the attention of the public mind. Numberless investigations have been made by sanitary scientists; hundreds of volumes and essays have been written by many of the most profound thinkers and brightest minds of the age; and thousands of addresses and lectures have been delivered by eloquent orators in furtherance of this laudable purpose. The laborious and painstaking efforts and thoroughly scientific researches of such practical investigators as Pasteur, Koch, Klein, Sternberg and others have created a renewed and increased interest in the subject, and marked a new and important era in its history.

The discovery and development of the fact that many, if not all diseases, and particularly those classed as zymotic or infectious, are due to the presence of specific germs or micro-organisms, which have their origin in, or are propagated by a contaminated and unwholesome condition existing in the essential elements before referred to, has opened a new and fertile field for investigation, and rendered many of the former theories and methods of sanitation comparatively valueless.

Do the abnormal and dangerous conditions referred to prevail or exist in the city of Pittsburg?

A careful study and analysis of the reports issued by the bureau of health during several years past show that while the general mortality of this city compares favorably with that of most others, yet that resulting from acute infectious diseases, embracing diphtheria, scarlet fever and typhoid fever, is considerably higher than that exhibited in many other and probably less favorably situated cities, when considered by the standard of natural advantages, and originally healthy site and surroundings.

The average annual death rate from acute infectious diseases during the past eighteen years has been about 21 per cent. of the total. Of this amount 14 per cent. was due to diphtheria, typhoid fever and scarlet fever, which prevailed in the order named.

That the peculiar conditions necessary to the causation or propagation of these diseases exist to some extent, at least, and in certain localities, is evident. Typhoid fever and diphtheria for a number of years prevailed to an almost alarming extent in the district locally known as the "South Side," embracing that portion of the city lying south of the Monongahela and Ohio rivers, and comprising the 24th to the 36th wards inclusive.

Several investigations made, seemed to point conclusively to a contaminated public and private water supply; a polluted soil resulting in part from those abominable relics of the past, privy-wells, defective plumbing and sewerage, lack of thorough isolation of the sick, and disenfection of premises and surroundings, as the most probable and effective agents in the causation of these diseases.

Within the past four years, however, both of these diseases have changed their *habitat* from the South Side to the East End district. The reasons for their forsaking the former district may not be quite perceptible, as at least some of the direct or predisposing causes continue to exist, although at present they appear to be in a sort of quiescent condition, but are ready, with a little encouragement, to again assert themselves. One of the most probable reasons, however, for the recent immunity from these diseases in the district referred to, is the improved and extended system of sewerage which has been inaugurated within the past few years.

Most of the causes for the existence of the diseases referred to on the South Side may also be found in the new and later scene of their activity, viz: The East End district. This district includes the better residence portion of the city, and is composed of the 13th to the 23d wards inclusive. Imperfect drainage and sewerage, and the use of the old style privy-well, both of which insure pollution of the air and soil, are the producing causes in some sections, while in others a contaminated water-supply is doubtless the reason for their existence. The im-

pure water-supply referred to is that obtained from wells and springs, the use of which is resorted to during the season of freshets in the river from which the public supply is obtained, and which is thus rendered unpalatable, while that obtained from the wells is regarded as greatly preferable on account of its being clear and cold, although it most likely is charged with the poisonous leachings from the surface, old and leaking drains, and the ubiquitous privy-well. The use of water from springs and wells is also compulsory in portions of this district, which are sparsely settled, on account of the entire absence of a public supply.

The subject of better drainage and sewerage for this district has received quite an impetus during the past few years, and it is hoped and believed that, with the completion of the extensive system contemplated and now in course of construction, the hygienic condition of the district will be greatly improved.

What of the fourth essential element necessary to good health, viz., pure food? It cannot be doubted that Pittsburg, in common with most other communities, suffers from the use of unwholesome and adulterated food. Avarice provides the product, or material, while ignorance, poverty, and a mistaken economy furnishes the market therefor. It is to be regretted that this subject has not engaged the public mind to the extent which its importance demands. It is with pleasure we note the fact, however, that this question was considered by the Legislature at its recent session, and that it is likely to be again at the next one, when it is hoped that some effective legislation will be enacted which will insure a proper remedy.

In this connection it may be remarked that the enactment of a law a few years since, prohibiting the manufacture and sale in this Commonwealth of "oleomargarine," one of, if not the least harmful of any of the adulterations of, or substitutes for pure and natural food, was unwise and unjust, however honest the motives which induced its adoption may have been. Oleomargarine is a valuable food stuff. While probably not equal to the best grade of butter, it is certainly much superior to the poor and rancid butter which is generally sold in our cities. One of the greatest dietary needs of the workingman is a sufficient supply of an inexpensive, wholesome fat. This necessity could be largely met by the use of this artificial butter.

As somewhat analogous and incidental to this question, the repeal of the law providing for the appointment of sealers of weights and measures in the several counties of this Commonwealth, might be referred to. That the citizens of this State are being daily defrauded to the amount of thousands of dollars, by unscrupulous and avaricious dealers in the necessaries of life, and especially food supplies, on account of the lack of this wholesome check, is evident, or can be made so, to the careful observer. It is to be hoped that both these enactments will be

speedily repealed in the interest of good health, as well as honesty and good morals.

Having thus briefly, and probably in a very unsatisfactory manner set forth the insanitary conditions which exists in some portions of Pittsburg, let us as briefly refer to a few of the sanitary necessities which should be considered and acted upon in order to insure to that community an improved condition of health.

The *first* necessity is a pure water-supply. This can be secured to the districts which now suffer for lack of it, by the extension of the city system, which thus far has succeeded in furnishing at least a comparatively good potable water. The experiment of sinking artesian wells, has recently been tested in one section of the South Side District, and proved to be successful, an excellent quality of water having been obtained at a depth somewhat exceeding 100 feet. This, if carried out to a conclusion, would doubtless do much toward solving the problem in that district.

The *second* necessity is the abandonment, by compulsory means, if necessary, of the use of water-wells, at least in the more densely populated sections. While it may be true that the water obtained from all of these, and at all times, is not unfit for drinking purposes, yet the fact remains that none of them are, like Cæsar's wife, "above suspicion." The risk of contracting disease through this medium is too great and frequent to be longer tolerated.

Third. The further extension of an improved sewerage system in the East End and South Side Districts especially. This would, of course, be attended with considerable outlay of money, but if viewed from a financial standpoint alone, it should be born in mind that the average cash value of a human life, as computed by competent authority, is about thirteen hundred dollars, which amount, if multiplied by the number of lives which could be saved to the community, saying nothing of the value of the thousands of days lost by the attendant sickness, would, in a surprisingly short time, pay the entire cost of an elaborate system of sewerage and drainage for the entire city.

Fourth. Better methods of construction and inspection of plumbing and house drainage. There is probably greater danger, to health and life, from faulty plumbing and imperfect trapping and ventilation, than from almost any other source. This is due, in a great measure, to the employment of incompetent or careless workmen, and the use of inferior material. The use of material below the best grades should be prohibited. Persons engaged in this important branch of sanitary work should be required to undergo an examination at the hands of competent authority, and only those who satisfactorily pass said examination should be permitted to perform such work. Then the inspection of plans, work and material should be rigid, and embrace every detail. This inspection should include not only new work and material, but old

as well. The employment of a single inspector, as at present, falls far short of the necessities of the case.

Fifth.—The abandonment of the old privy-well wherever it is possible to connect with sewers. This should also be made compulsory, and should not only involve their disuse, but the prompt removal of the contents, together with that of the contaminated soil surrounding it for a diameter and depth co-extensive with the pollution, and the filling of the excavation thus made, with pure earth, and the application of disinfectants. Where sewer connections cannot be made, the dry-earth closet might be used to advantage in many cases. In lieu of this, shallow wells should be constructed, not more than eight feet in depth and of a convenient diameter. These should be lined with hard burned brick, laid in cement, and both inside and outside surfaces thoroughly cemented. The contents should be removed frequently, and by means of a pump or other similar inoffensive appliance.

Sixth.—A better system and method of collection and disposal of waste material, garbage and offal. At present the collection of this material is a matter of private enterprise, conducted in a sort of slipshod manner by means of appliances crude and unsuited for the purpose, and at least in some instances by irresponsible parties. Some of it is delivered at the single garbage furnace owned and operated by the city, while the balance and larger portion is deposited in the rivers, on vacant lots, or other not less objectionable places.

It should be collected and removed daily during the heated term, and three times per week during the balance of the year, either under contract between the city and proper persons and paid for by general taxation, or by the municipality itself, it owning the teams and apparatus. The removal should be made by means of properly sealed iron tanks, mounted on two or four wheels. Additional furnaces should be erected, or other proper means and appliances provided at convenient points, where it could be promptly disposed of in an inoffensive manner.

Seventh.—More thorough and scientific inspection of the food supply. That unwholesome and adulterated food plays an important part in the causation or propagation of disease, at least by means of an impaired vitality resulting from its use, there can be no doubt. The means of detection should be at all times at hand, and the punishment swift and sure. To do this, the aid of the chemist and microscopist are indispensable. The methods now in use in Pittsburg fall far short of the ideal and necessary means to accomplish the end in view. On account of a lack of funds for securing the proper appliances, and the employment of fitting talent for the prosecution of this important work, the inspection of food has been confined to a few commonplace articles of every day use, and conducted in a very superficial manner. The employment of one meat and milk inspector and an inspector of vegetables, is the

sum total of the protection from imposition of this character afforded a city of more than a quarter million of inhabitants.

Eighth.—More complete isolation of those suffering from infectious diseases. The law now existing and applicable to the sanitary care and treatment of small-pox should be made applicable to diphtheria and scarlet fever. Houses in which these diseases exist should be placarded and guarded, so as to prevent any chance of the intermingling of the community outside, with those inside the infected premises or family. These precautions should also be required of those residing in the same family or house in which the disease exists. If need be, the inmates should be fed and clothed at the public expense until all danger of infection has passed away. It will be found much more economical to do so, when it is considered that while small-pox, which is so much dreaded, and yet so easily prevented, kills only scores, and at long intervals, the diseases mentioned are ever present with us, and count their victims by the thousand.

Ninth.—Proper sanitary regulations governing the care and burial of the bodies of victims of infectious disease. The tender ties of relationship and sympathy for the sick are sundered by death, and should thenceforth be wholly extended to, and manifested for the living. In furtherance of this object, the body should be at once thoroughly disinfected and placed in the casket, which should be securely closed and not again opened, unless special permission be granted by the health authorities. The funeral should be strictly private, and attended only by the immediate relatives, none of whom should be children.

Finally.—Thorough and scientific disinfection of persons, clothing, houses and surroundings should be practiced. The methods of disinfection now in use are antiquated, and their application quite too superficial. They are relics of the time when the substitution of one odor for another was regarded as the *ne plus ultra* of disinfection. As previously referred to, the development of the germ theory has entirely revolutionized this branch of sanitation. Many of the former agents used for this purpose, and popularly supposed to be of great benefit, have, in the light of recent discovery, and practical tests, been found to be quite valueless, at least as germicides.

Wynter Blyth, Medical Officer of Health for Marylebone, in a paper published in the London *Medical Times and Gazette*, in 1884, thus treats the subject: "Rampant rides the quack in the fields both of preventive and remedial art. Quackery takes a well-known common powder, labels it with a grand mystic name, selling bright copper at the price of gold. Qackery finds a stink outstinking feebler stinks, and gives it forth as a disinfectant. Of all the substances gathered together under the name of disinfectants—solids, vapors, gases and odors—a small percentage alone possess any value."

This opinion may sound harsh, and appear to be too radical and sweeping, but the result of recent investigations goes to prove that it applies

to very many of the so-called disinfectants with which the sanitary market is flooded.

A few of these, as well as many of the well-known and recognized chemical agents, or combinations of agents, have proven to be of value. In order to insure their success, however, they should be intelligently applied. Besides, some of the most effective agents are of a character dangerous to health and life if handled and used by persons ignorant of the fact, or unfamiliar with the proper method of application. For this reason, as well as to insure the best results, the use of disinfectants should be under the direct supervision and control of the sanitary authorities. A disinfecting corps, composed of intelligent and reliable persons familiar with the subject, should be organized and thoroughly equipped with all the modern and necessary appliances and materials, and placed in charge of each and every house or premises where found necessary.

The most effective in the list of disinfective agents is fire, which should be applied in all cases possible when infected bedding, clothing and similar material is involved. In most instances it is impracticable to carry out this method, when its application is left to the option of the persons interested, and also on account of lack of proper facilities for the purpose. The health authorities should be supplied with a proper plant for the destruction of such material, which destruction should in all cases be conducted by them. This plant could be conveniently erected upon property already owned by the city, and at a comparatively small expense.

The next best method for the disinfection of such material is by subjecting it to a high degree of dry or moist heat. This also cannot be satisfactorily accomplished by private parties, for the same reasons as those mentioned in connection with disinfection by fire. Suitable appliances for this purpose should be provided at the public expense, and operated by the health authorities. These could also be located upon property already owned by the city.

Further consideration of "disinfection and disinfectants," being such a long, wide and deep subject, I am compelled to forego, and intrust it to others abler and more competent. While it has been ably and intelligently discussed and investigated by the American Public Health Association, our own very efficient State Board of Health, as well as many other scientific bodies and individuals, yet it being a subject so exceedingly important, and so little understood by the general public, I trust that it may find a place in the list of questions to be considered by this convention.

On the Sewer System of Erie, Pa., and the Indispensable Improvements Needed Therein.

By George Platt, City Engineer, Erie, Pa.

Sanitary science is of modern growth as we understand it. The subject has only engaged the attention of scientific men for the previous forty or fifty years, and it has been discovered that the greatest enemy to man's comfort, if not his health, was man himself; and the best method for the prompt removal of noxious refuse from the vicinity of his dwelling, which to the primitive inhabitant was a subject scarcely worthy of a thought, soon forced itself upon his attention as a subject, above all others, deserving of his careful consideration.

It has become evident that sanitary measures, in order to be efficient, require a recognition of certain laws of nature which had heretofore remained in obscurity.

Sanitary science has now become a recognized branch of medical study, as sanitary engineering has become a branch of the art of construction.

Effective drainage and sewerage has been shown in so many reports, from professional men and government commissions, that its influence on health, as well as length of life, is gradually beginning to be understood.

Drainage and sewerage are essential elements of health in all populous localities.

Calculated as a matter of profit and loss, everything would indicate that the expense required in establishing proper measures to avoid these evils would be far below the loss consequent upon the inefficient arrangement too frequently witnessed at the present time.

The disposal of the solid and liquid refuse becomes a serious problem in large towns and cities. The storing of the filth of a city within the city is to invite disease and death. The soil becomes polluted with sewage, and the air is filled with impure gases arising from the same.

The earth upon which many of our cities stand is completely saturated with sewage, contaminating the air and a constant reminder of the need of an efficient remedy. Few people comprehend to what extent the filth of cesspools contaminates wells from which water is used for domestic purposes.

We often hear it said that water passing through the earth is purified. But, realizing that the earth acts as a sewer and removes only suspended impurities, the part that is in solution remains in the water. Clearness is no proof of purity in water. The water of our mineral springs, although thoroughly impregnated with various minerals, is as clear as ordinary spring-water, and in a glass of water as clear as a crystal there may be poison enough to kill a whole family.

I was reading a short time ago of the Swiss village of Lausen, near

Basle, which was supplied with water from a spring situated at the foot of a mountainous ridge called the Stockhalden. In this village, where there had not been a single case of fever for many years, an epidemic of typhoid fever broke out and struck down seventeen per cent. of the whole population. The cases of fever were pretty evenly distributed among the families in the village with the exception of six. As the six families which escaped did not use water from the spring, suspicions were aroused concerning the water and investigations were made.

It had formerly been noticed that when the meadows in the Furlerthal, a little valley on the other side of the Stockhalden ridge, were irrigated, the volume of the water in the spring was increased; and by the sinking of the soil in one of the meadows in the Furlerthal a vein of water was discovered which it was supposed led to the spring in Lausen.

It was found upon investigation that a peasant living in Furlerthal had returned from a distant city sick with fever, and that the brook in which his clothes had been washed and into which the slops from the house had been thrown, had been used to irrigate the meadows. This water thus spread over the fields and then filtered through the ridge, a distance of a mile, still carried the germ of disease in it and brought death to the inhabitants of Lausen.

To prove conclusively that the spring was supplied from the Furlerthal, and to determine whether the water passed through an open vein or was filtered through porous material, the following experiments were made: Several hundred-weight of salt was dissolved and poured into the hole in the Furlerthal where the vein was discovered. In a few hours the water of the spring became very salt and the connection between the water in the Furlerthal and the spring at Lausen was established beyond a doubt.

They now mixed two and a-half tons of flour in water and poured it into the hole, but no trace of the flour could be found in the spring, proving that the water was so thoroughly filtered as to remove the minutes particles of the flour and yet still retained its infective properties.

My object in quoting the above is to show to what extent ground saturated with sewage may poison water in wells that are some distance away.

Many of the sewers of this city are simply receptacles for filth, the liquid portion of which is leaking into the soil and gradually poisoning the ground along their route; the solid substance remaining creating poison to be forced into dwellings by way of the connections on every occasion of wind pressure at the outlets, or when filled with storm water.

The sewers of Erie are what is termed the combined system, intended to convey storm water as well as sewage, and, considering the cost of them, they are a poor return for the outlay.

There are 9 6-10 miles of brick sewer in the city, the diameters of which range from one and one-half feet to five feet, costing $222,964.54;

sewers of brick and stone, 0.135 miles, costing $4,438.31; tile sewers, 19.364 miles, the diameters of which range from twelve to twenty-four inches and costing $210,341.38; total cost of all sewers, $437,744.23; total length, 29.098 miles

The First ward has 4.271 miles; the Second has 6.718 miles; the Third has 8.906 miles; the Fourth has 5.648 miles; the Fifth has 2.127 miles, including 3,625 feet in the Warfel addition; the Sixth has 1.428 miles.

The outlets are as follows: Little Cascade run receives 4,741 feet, about nine-tenths of a mile; Garrison run receives 5,303 feet, a trifle over one mile; Canal Sewer and laterals, discharging directly into the bay, 24,031 feet, a trifle over four and a-half miles; Peach, French and Holland and laterals, 5,794 feet, about 1 1-10 miles; Mill Creek, 113,769 feet, equal to twenty-one and a-half miles, the whole discharging into the bay by the several routes.

Our tile sewers, especially those put down previous to the past ten years, are mostly useless through incompleteness of construction and flat grades. Many of them are over half filled with the surrounding soil that passes through the joints.

They will not bear the pressure of flushing for the reason that the sections do not line with each other, and the water used for flushing is as liable to cut outside as inside of the pipe. Such of the sewers as have been taken up are exceedingly filthy, and the only remedy is to tear them out, and the sooner this is done the sooner dwellings will be relieved from poisonous gases

Many of the sewers are extremely shallow and with very flat grades, which makes it difficult for the engineer to find suitable outlets, and unless he sometimes adopts a longer route than would otherwise be necessary he would be liable to add to the number of inefficients.

In one instance where it became necessary in order to pave a street that about 165 feet of sewer be constructed, which at the usual price would have cost $323, it became necessary to construct a sewer costing $2,680 to procure an outlet.

One other sewer, 24 inches in diameter, about 1,300 feet long and costing $2,485, is practically useless so far as outlets for other sewers are concerned. It is barely deep enough to receive the sewage of the residences along its line. Could these old sewers be exterminated without causing other damage it would be a decided benefit, and the public would be the gainer. Why they were constructed in the manner that they were is more than I can comprehend.

The topography of the city of Erie is such that it would seem to suggest to the engineer the position of the main sewers and laterals with but little study. This was forcibly presented to my mind while making a map of the contours of the city for every five feet of eleva-

tion during the winter of 1886 and 1887. The only study required was to subdue the fall instead of looking for the same.

Where the soil is made up of different strata, some of which are impervious to water, the benefit derived from a properly designed system of sewers is not confined to simply carrying away the sewage, but the water in the soil is drained away.

In some cases special drains will need to be laid to carry the ground water. But it will be found that simply digging the sewer-trench and refilling around the pipe with sand and gravel will make a marked difference in the condition of the surrounding soil. Cutting through the impervious strata and partly refilling the trench with porous material will frequently effectually drain very wet soil. It has been found in several cases where the work on sewers had been delayed and interrupted by running quicksand, that on reopening the trench after a little time the water had mostly disappeared. This has especially been the case during the construction of some of the sewers in Eighteenth street, and it is a matter of surprise to know the area that sometimes will be found drained by this alone. The draining seems to be brought about by the cutting of water courses and the tendency of the water to follow the course of the sewer outside of the pipe.

The effects of a dry subsoil in its influence on the health of residents has been frequently noted, and a greater number of deaths from various diseases is seen where the inhabitants are located upon a retentive formation than takes place when they are located on a porous one.

Although the drainage of the subsoil forms no part of the sewers proper it is undeniable that notwithstanding all efforts to the contrary that so-called impermeable sewers, do to a certain extent, drain the subsoil of the subsoil waters.

There is no difficulty whatever in rendering a brick or pipe sewer water-tight, as it should be, if it be desirable to avoid a deposit of sewage within it, and the trench will still permit the withdrawal of the subsoil water without any further provision for it, provided it be not encountered in too great a volume.

If springs of water occur in the sewer, trench provision must be made for their removal by means of ordinary tile so laid as to collect surrounding water.

I am decidedly opposed to the combined system of sewers for this city, but they are here and here to stay. But if our city fathers or the general public could see the sewers as the engineer sees them, there would be some hope for improvement.

Staley and Pierson say, in their work on the "Separate System of Sewerage," that a theoretically-perfect sewer would be one in which all of the sewage would be carried rapidly to its outfall outside of the city, so that no time would be given for decomposition. The conduit itself should be smooth, impervious to water and should be water-tight

through its entire length. It should be flushed at intervals, and so thoroughly, that the development of any sewer-gas would be impossible. The large sewers of the combined system are usually constructed of brick. The brick, being porous, allows more or less of the sewage to escape into the soil, even if every joint is water-tight, which is never the case.

The rough surface of the bricks soon becomes covered with a slime of organic matter, which is constantly decomposing.

In designing sewers on this system, the size will be determined by the amount of rainfall per hour during storms and the surface to be drained.

The volume of rainfall to be provided for, is so much more than the sewage that the amount of sewage scarcely enters into the computation. It is readily seen that ordinarily the sewage will be but a trickling stream in a sewer large enough to carry storm-water.

In a rush of water during a storm, however, a considerable quantity of the material which issupposed to remain in the catch-basin is carried into the sewer, and this, with other foreign substances which reach the sewer by reason of absence of catch-basins, settles on the bottom. These obstructions form a series of small dams in the sewer, and in dry weather the sewage stands in a succession of pools along the line, decomposing and sending up volumes of sewer-gas out of every crevice through which it can escape.

The great size of the combined system, it is seen, is detrimental to their efficiency in removing sewage rapidly and completely, and yet for he purpose for which they are supposed to be designed they are seldom large enough. Even where vast sums have been spent to construct the combined system of sewers it is seldom, if ever, that they will carry the water of great storms.

In many large cities, where millions of dollars have been expended for sewers of great size, the extraordinary storms are not provided for and the consequence is, the sewers overflow and cellars and basements are flooded with sewage. Where storm-water is excluded from the sewers, or only a definite amount admitted for the purpose of flushing, no such disaster can occur.

I am decidedly in favor of the separate system for both the eastern and western part of the city, or rather a combination of both systems.

The Liberty street sewer, being a part of what will be known as the intercepting sewer, will take care of all the sewage west of Poplar street, and a good portion of the same between Poplar and Cherry street.

The eastern portion of the city can be taken care of by a sewer up Ash Lane; also by one through Wayne street.

These sewers will be large enough to receive a great part of the surface water in their vicinity. So far as the laterals are concerned, I will rec-

ommend that they be constructed to convey sewage and nothing else. Under the separate system, aside from the cost of the outlet sewer, the cost of the laterals will be over 70 per cent. less than if constructed to carry street water.

The surface water of the city, east of Parade street, can with little expense, be taken care of by the construction of ordinary gutters paved with cobblestone.

I never could see the necessity for the construction of large sewers for the purpose of carrying storm-water when it can so easily be made to take care of itself by way of the gutters with an occasional stretch of shallow sewer. A little care in grading the street will take care of all the storm-water in the outer districts of this city.

The cost of sewerage works is often made unnecessarily great with the idea that it is the duty of the public to furnish an outlet for factories, slaughter-houses and all manner of establishments which are carried on for individual profit and in which the cost of removing the resultant refuse, is fairly chargeable on the business rather than on the public purse.

So far as the community is concerned it should be compelled to construct sewers only for the removal of such waste matters as are incident to the daily life of all classes of our population.

If breweries, chemical works and other manufactories producing a large amount of liquid waste are to be provided with a means of outlet, this should be done entirely at their own charge. Their profit and convenience should not be advanced at the cost of every member of the community.

The sanitary authority of every city should have entire control over the sewers, with power to decide what shall be admitted to them and what excluded.

The more important considerations affecting the question of town sewerage were stated in the "General Conclusions" of the English Board of Health, after a thorough investigation of the whole subject of sewerage, as follows:

First. That no population living amidst ærial impurities arising from putrid emanations from cess-pools, drains or sewers of deposit can be healthy or free from attacks of epidemics.

Second. That as a primary condition to salubrity no ordure or refuse can be permitted to remain beneath or near habitations, and by no other means can remedial operations be so conveniently, economically, inoffensively and quickly effected as by the removal of all such refuse dissolved or suspended in water.

Third. That the general use of large brick sewers has resulted from ignorance and neglect, such sewers being wasteful in construction and repair and costly through inefficient efforts to keep them free from deposits.

Fourth. That brick and stone house drains are "false in principle and wasteful in the cleansing, construction and repair. That house drains and sewers, properly constructed of vitrified pipe, detain and accumulate no deposit, emit no offensive smells and require no additional supplies of water to keep them clear."

Fifth. All offensive smells proceeding from any works intended for house or town drainage indicate the fact of the detention and decomposition of ordure and afford decisive evidence of malconstruction or of ignorant or defective arrangement.

The subject of the sewerage and drainage of any city is of more importance than of any other one subject connected with any well-regulated municipality.

It should be considered and acted upon prior to any plans for paving or the construction of parks or any work in the way of ornamentation. There can be no question that one improvement stimulates and propagates the other.

The demands of public protection of health are not only of medical interest, but they are at the same time linked together by the closest tie with the welfare of public economy, and with the moral advancement of the people.

Intelligent men must be well aware that, with the exception of the public schools, there are no other means of more surely influencing the moral elevation of the lower classes than the promotion of public and private cleanliness. The sentiment of the people should be thoroughly aroused, and every intelligent man is, or should be, in favor of sanitary reform.

The complete sewering of cities and draining of houses and public grounds must be considered a prime necessity under all conditions and circumstances.

The very best talent of the civilized countries is now employed to improve in all directions the sewage system.

I desire to call attention to the wants of that portion of the city situated north of Eighteenth street and east of Parade street. A great portion of this section is rapidly being built upon, and the nature of the ground is such that it might generally be termed "soaked." Plans and maps are made and can be seen at my office, showing about seven miles of a system that could be put down, if done under one contract, for less than $25,000, excepting the main sewers. Why cannot this be done? It is done in other cities. It would be the saving of many lives, especially of the women and children. It would be a saving to the city, for when a sewer system is put down by piecemeal it becomes expensive to construct.

The same might be said of the sewers west of Cherry street and north of Eighteenth street, except that the need is not so great there; but both are needed and should be pushed to completion.

The greatest obstacle to the west side is the want of the "Intercepting Sewer."

I will not attempt to predict when it will be constructed, but until it is, the west side will wait a long time for a much needed improvement, unless they are allowed to discharge their sewage by way of the "Little Cascade."

Just at this time it would make but little difference, so far as our source for procuring water to supply the city is concerned, for the bay is receiving all of the sewage of the city by some one of the routes.

I will forbear making any statements relating to our water supply for many reasons.

I am not wedded to the separate system of sewers for all cities, but for cities of this class and smaller ones. Were I called upon to establish and put down a system for effective duty, I would certainly recommend the separate system. With a separate, properly constructed and properly managed system of impervious pipes for the removal of all sewage and with other sound sanitary regulations for the care and removal of solid organic refuse, there is no reason why the spring and well water in towns should not remain clean and wholesome. Besides, when the earth of inhabited places is kept so clean as to preserve the purity of the water, no exhalations will arise from it dangerous to health and life.

I desire to call your attention to the great difference in the cost of the two systems, and will again quote from Staley and Pierson, who say that "among the advantages in favor of the separate system, the one that appeals most strongly to the average citizen, is that of reduced cost." This is the argument that reaches the heart—or which is quite as necessary the pocket—of the taxpayer. One of the grave objections to the combined system is its cost. The actual cost of such systems has been from five to ten dollars per lineal foot. The cost of the separate system has varied from seventy-five cents to two dollars per foot. It is safe to say that under ordinary circumstances its cost will be from one-eighth to one-third of that of the combined system.

Mr. W. J. McAlpine—a very eminent engineer—estimated the cost of a combined system for the city of Schenectady, N. Y., at $240,000. The total cost of the separate system now completed—by the parties from whom I quote—was about $35,000.

It may be asked, why the combined system is still adopted in so many cases, if the advantages of the separate system are so apparent? The answer to that question is, that engineering precedent carries great weight with it among engineers, and venerable error even is hard to put down.

The combined system is one of natural growth. In cities the natural water-courses are covered over and converted into sewers, and branches are built leading to them.

Then the branches are extended until they form a complete system of sewers. You can see the beginning of this system in almost any town which has a small creek running through it. The creek will partly be covered, and branch drains be constructed leading into it before the subject of sewers is brought up for consideration.

When the matter does come up, the chances are that the system already begun is simply extended and completed, and another bad precedent is set, and makes the introduction of the better system more difficult.

The introduction of the better system marks an important era in the development of sanitary drainage, recognizing as no other system has, the prime importance of an early removal of household and industrial wastes, which are the main factors in soil pollution.

I have no hope that any improvement can be made with our oldest sewers that are already in use until they fail entirely. Whenever attention is called to them, the authorities seem to treat the matter with indifference, and councils will defer action, or move to file the whole matter. The sewers are out of sight, and the disposition seems to be to let them remain so.

I will not dwell upon this matter, for it cannot be treated thoroughly without taking too much time; but I would like to call your attention to the convenience of flushing the smaller sewers.

Wherever the separate system is in use, automatic flush-tanks are constructed in such a manner that from two to three hundred gallons of water can be sent through them each day, week or even month, as desired, keeping the sewer clean and free, leaving no matter to putrify, nor space for sewer-gas.

TYPHUS FEVER, ITS DIAGNOSIS AND PREVENTION.

By Wm. B. Atkinson, A. M., M. D.

Standing as we now do in the presence of a probable invasion of this plague, the result of the filth, and misrule of the European masses, it behoves every physician throughout the length and breadth of the land, but especially those who are located in the direct line of this invasion to be prepared to know the earliest diagnostic signs by which to recognize it. So little opportunity has been afforded for its study in later years, that few physicians have seen a case, and fewer still would be able to detect its presence until too late to interpose the proper means to prevent its rapid spread among the crowded tenements where it would

most likely be first to make its appearance. Unlike small-pox, the mere naming of which serves to cause a horror to arise among those who may be exposed, it is not regarded by the average person as a special source of danger. Indeed the fear of small-pox even by those who are educated, is in many instances ludicrous in the extreme. They shun the guard who standing in a perfectly safe place, prevents the ingress or egress of any to the infected house. They are violently affected by fear of the face of one who shows its ravages, even when all danger of infection has long gone by. Yet, they needlessly, wilfully expose themselves and their children to the far greater danger of diphtheria or scarlet fever, and refuse to be guided by the advice of the sanitarian, who warns them of the dangers of public funerals, of unnecessary visits to infected houses, of kissing those who are still suffering from the disease. In this connection, I may point a moral by the relation of an instance of recent occurrence. I was summoned by a physician to attend his child, ill with sore throat, who had undoubtedly been infected by the idiotic action of a young man who called at the house, and recklessly kissed the child, though he was still suffering from what he said was an "ulcerated throat."

When typhus fever is known to exist, all persons coming from the locality infected, should be regarded as likely to carry the disease in their systems for at least twenty-one days. During that time they should be kept under careful surveillance, nor should any such persons be permitted to wander round at will lest their clothing, if not their persons may convey the seeds of the infection. Unfortunately, such people do not prefer those neighborhoods where pure air and cleanliness abound, but choose rather the vile, filthy, crowded tenements where the contagion of the disease is most sure to find a congenial soil in which to grow and produce its kind. It may be considered as beyond cavil that typhus fever cannot long exist in the presence of sunlight, pure air, cleanliness, even though poverty and famine may abound. We do not doubt that the latter may be factors in the progress of the disease, yet fortunately the best disinfectants for it are sunlight, pure air, and cleanliness. Hence, by promptly isolating those who have been exposed, and placing them for the proper time under the conditions which are most inimical to the affection, we greatly lessen the tendency to its inception, and its malignancy, should it appear. The question of the length of quarantine requisite for safety, is still subjudice, but we believe twenty-one days will suffice with the employment of proper hygienic measures. In the early diagnosis, it must be remembered that the name typhus is derived from the Greek meaning stupor, and this symptom is always more or less early in its appearance. A person who had been exposed, and who presented this symptom, particularly should it appear suddenly, ought to be regarded with suspicion, and the proper quarantine and isolation should be enforced.

Rarely if ever, are those prodromic symptoms observed which are incidental to typhoid, where the patient for days or even weeks exhibits lassitude, more or less diarrhoea, etc. In typhus the formative stage is very much shorter, the invasion is abrupt. Usually, but one day elapses before the patient is compelled to go to bed. Another symptom at the outset, is a darkening of the face owing to capillary congestion. Few who have encountered this disease, fail to recognize this condition, and to mark it as widely different from that of typhoid fever. In very many patients, the face early assumes the appearance of a drunkard, utterly wanting in expression. Hence, in cases where the attack has been abrupt, the error has been made of regarding the case as one of drunkenness, and valuable time has been lost. The next marked symptom, which, however, is not always present, is the eruption upon the skin about the beginning of the third day of a maculated rash of a dull red color, which does not disappear under pressure, unless perhaps at a very early period. This eruption is abundant, and usually over the whole surface, even on the face.

While other symptoms may be mentioned which are more or less distinctive of the disease, as the early appearance of sordes in the mouth, greater frequency of the circulation than in typhoid, etc., yet the symptoms enumerated are so marked, and almost invariably appear so early, that we believe they are a sufficient indication of the dangerous affection that is present, and should never be disregarded.

The period of incubation is a variable quantity. Twelve to fourteen days are by many authorities considered the time beyond which it is safe to say that the person who has been exposed will not be affected, yet as in some instances the disease has occurred later, three weeks may be regarded as the proper time during which quarantine should be enforced.

It appears that this disease requires more concentration of the poison in order to extend itself to those around, hence nurses, physicians, etc., while they are occasionally attacked, are less liable to be, and the spread of the disease is readily controlled by hygienic precautions, isolation of those infected, and the destruction or baking of all clothing, etc., of those who are affected with the disease, or who have been compelled for a time to remain in its presence, as on shipboard, etc.

Unlike typhoid, it may be communicated directly from the patient or from infected clothing. While, therefore, quarantine is not necessary in typhoid it becomes imperative in typhus.

REPORT OF COMMITTEE ON SANITARY CONVENTION HELD AT ERIE.

By S. T. Davis, M. D.

Harrisburg, Pa., *May 13, 1892.*

Benjamin Lee, M. D, *Secretary:*

Dear Sir: It is with feelings of great gratification that the Committee on Sanitary Convention feels warranted in reporting the sixth annual convention, held at Erie, Pa., March 29 to 31, 1892, the most successful held under the auspices of the State Board of Health since its organization in 1885. To Dr. A. A. Woods, health officer of Erie, and the gentlemen composing the local committee, in connection with yourself, belong the credit of arranging an excellent programme, which was of sufficient interest to elicit the attention of all in attendance at the meetings. The gentlemen who read papers and took part in the discussions, impressed all in attendance with the importance of the prevention of disease, consequent prolongation of human life and happiness and the merits of the special subjects discussed.

To particularize on the merits of any paper presented would be practicing a partiality without a distinction, or a patent reason. All were good, mainly composed of original matter and presented in language which enable the general public to fully comprehend the subject matter and was calculated to interest them in sanitation.

At the close of the convention the citizens of Erie placed themselves on record as being the first to banquet the State Board of Health of Pennsylvania. Your committee would suggest that the programme form a part of the next annual report of the State Board, and desire also to suggest that a small expenditure of money in billing the town or locality in which future sanitary conventions are to be held would assure more general attendance at the meetings and would be productive of much more good than mere newspaper notices which meet the eyes of the comparatively few. The valuable lessons to be learned at sanitary conventions are not only interesting to physicians and sanitarians, but to become of true value must reach the general public, inasmuch as among the latter class we find the least attention paid to the laws of health.